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Vol. II.

COLLECTED STUDIES FROM THE RESEARCH LABORATORY.

NEGRI BODIES, WITH SPECIAL REFERENCE TO DIAGNOSIS IN SUSPECTED RABIES.

By Anna W. Williams, M. D.,
*Assistant Director, Research Laboratory.**

The history of the findings in hydrophobia is rather instructive. Up to 1903, notwithstanding much painstaking work on the lesion in this disease by many of our most eminent pathologists, certain bodies described then for the first time by Negri (possibly seen before by one other recording observer), were entirely overlooked. And what makes it more interesting is the fact that these bodies, with the methods now in use, come out with such startling distinctness and individuality that even the beginner in studies on the nervous system cannot miss seeing them.

In the research laboratory of the Department of Health Dr. Poor has corroborated the work of others in regard to the presence and specific nature of these bodies in fixed and stained sections from the nerve centers in cases of rabies, and, for some time, has used the section method for diagnosis. By this method, however, it is impossible to make the diagnosis before 24 hours, and no one, so far as known, has published a much shorter way of demonstrating the bodies satisfactorily.

In connection with a report made by Dr. Poor before the New York Pathological Society in 1904, the writer demonstrated a smear from hydrophobia brain tissue containing these Negri bodies and recommended the smear method for rapid diagnosis. Smears were made and studied at that time at the suggestion of Dr. Ewing who, as we all know, had obtained such good results by this method in his "Studies on Ganglion Cells."

By the technic then employed, though the Negri bodies were brought out clearly, they were delicately stained and their differentiation from the surrounding tissues, especially from the red blood cells was somewhat difficult.

Recently the work has been taken up by me again, and it has been found that by slightly improved technic and a different stain, the

* Read at the New York Pathological Society December, 1905.

" bodies," in most instances, if not in all, are brought out more distinctly and more characteristically, and can be identified in a much shorter time and by a much simpler and less expensive technic than by any method so far published.

The work has been controlled on one side by section cuttings and animal inoculations and, on the other side, by smears from the central nervous system of normal animals and of animals that have died from tetanus, diphtheria and meningitis; and it seems reasonable to make the positive statement that the bodies seen in smears as well as those seen in sections are specific to hydrophobia.

Further, the smear work seems to have brought out more clearly than the section work that these bodies are not degeneration products, that is that they have an individuality distinct from the nervous tissue. This is shown by the fact that they are definitely and regularly structured according to the age of the lesion and that the structure and staining qualities are analogous to those of certain known protozoa, therefore it makes it practically certain in my opinion that they are living organisms belonging to the group of protozoa and that they are the active cause of hydrophobia.

The technic is as follows: The nerve tissue is obtained as soon as possible after the death of the animal (though smears made as late as 13 days after death when the tissue had been kept in the ice-box have shown bodies stained well enough for diagnosis), and smears may be made in any way that will get the tissue quickly and evenly on the slide. However, I have found that the best results can be obtained by the following method:

The small bit of nerve tissue required for the examination is cut out with the point of a small scalpel or with a small, sharp scissors and placed upon a glass slide. A cover slip is put over the piece and pressed upon it gently until it is well spread out, then, with the finger still pressing lightly, the cover slip is moved along to the end of the slide. It moves very easily and makes a thin more or less evenly spread smear.

The smears are allowed to dry in the air and are fixed either in Zenker's fluid or in methyl alcohol.

The two staining methods which have been principally used are Mallory's eosin-methylene-blue method and Giemsa's azur-eosin method. A comparison between the results obtained by the use of these two stains is most instructive. The eosin-methlyene-blue method, if the decolorization is carried to a marked extent, shows the protoplasm of the bodies staining with eosin, while the central bodies and granules are a dark blue. When the decolorization is not carried so far the cytoplasm of the bodies appear more of a magenta, showing that they are not purely acidophile.

In sections the apparent acidophile character of the bodies is even more marked than in the smears, hence observers have always spoken of them as acidophile, and since protozoa are known to be basophile, opponents of the protozoan theory of their nature have considered this a strong point on their side.

The Giemsa stain with the smears, however, has shown that they are really more basophile than acidophile in character and that the central body takes up the pure nuclear stain—the azur.

The bodies vary in their stained appearance according to the time stained, the amount of decolorization, the thickness of the smear, the age of the lesion and the length of time after death. In the stage of the disease that is usually found in the so-called "street rabies," that is in the stage that oftenest reaches us for diagnosis, most of the bodies, according to the Giemsa method of staining with the stain left on for one hour, stain a rather dark robin's egg blue, the granules and central bodies purple. With more decolorization, the protoplasm is a clearer blue and the chromatin masses red. Many of the bodies by this method of staining show a double contour or membrane-like periphery which may be an artifact as it is more apparent in bodies within the cells and in the thicker parts of the smears. For the purpose of diagnosis the bodies may be stained sufficiently characteristically with concentrated Giemsa in 10 minutes.

The finer structure of these bodies will not be spoken of in detail at present, suffice it to say that the small rounded forms show a chromatin staining ring-shaped central body, the small oval forms may show two or three such bodies, some of the larger rounded forms show chromatin bodies arranged more or less regularly around the periphery as

well as in the center. Some of the large oval forms show a chromatin rounded body nearer one end with small chromatin granules irregularly scattered throughout the rest of the body.

The staining characteristics together with the fact that the morphology is so characteristic, makes it practically certain, as I have said, that the bodies are protozoa, and their site, time of appearance, numbers and absence from other diseases make it as certain that they are the cause of hydrophobia.

RECENT STUDIES IN THE DIAGNOSIS OF RABIES.

By Daniel W. Poor, M. D.,

NEW YORK.

Assistant Bacteriologist Research Laboratory of the Department of Health.

It is obvious to those who have to deal with people bitten by animals supposedly rabid, that a quick method for the diagnosis of this disease in the animal is most desirable. The length of time consumed by the inoculation test, with its consequent suspense and worry to the patient, together with the resulting delay in starting treatment, and further the occasional failure of the test through premature death of the animals from septicemia, are all reasons for stimulating work on the histological methods of diagnosis.

Since the time of Pasteur, work has been done along this line, and it may be of some interest to summarize very briefly the results without going extensively into the technicalities of the subject. It is obvious that a satisfactory method of diagnosis must fulfil, as nearly as possible, the following conditions. First, the lesions should be characteristic of the disease; second, they should appear early in the disease as well as late; third, the technique should not be so difficult and exacting as to render its accomplishment frequently impossible under the conditions which we have to meet practically, and further the lesions should be sufficiently definite to form the basis of a positive opinion. Lastly, it is desirable that the microscopical picture be as little as possible affected by the changes produced by post-mortem decomposition and freezing.

Some years ago Babes described lesions which he considered characteristic of rabies, the essential points of which were, a collection of embryonal cells surrounding the central canal of the cord, and the ganglion cells, particularly in the medulla. The ganglion cells degenerate—chromatolysis being especially characteristic—and their spaces are occupied by the embryonal cells which constitute the so-called "rabic tubercle." From what can be learned, this method has not been in general use extensively, owing to the fact that these lesions are not constantly present in rabies, and that they may also be found in other conditions.

Later, Van Gehuchten and Nelis described changes in the sympathetic ganglia, the intervertebral ganglia, and in the plexiform ganglia of the pneumogastric nerve. In these locations the nerve cells lie in capsules lined with endothelial cells. The changes said to be characteristic of rabies are the atrophy and destruction of the nerve cells brought about by the new formed cells from the capsule, which finally occupy the entire capsule.

Ravanel, who has used this method of diagnosis, considered that the changes in the intervertebral ganglia are more constant than those in the medulla. He has reported a series of twenty-eight cases, including eleven dogs, one cow and one horse, all having street rabies, and fifteen rabbits inoculated from these animals. In all except the horse positive changes were found, although in one of the cases they were very slight. In twenty-one cases examined for the lesions described by Babes, seventeen showed characteristic lesions. In two only chromatolysis of the cells was found, and in two no lesions were seen. Similar lesions to those of Van Gehuchten have been found in the ganglia by Crocq in one case, and by Van Gehuchten in three cases of diphtheria. Four cases in man have been reported as having lesions identical with those of rabies, including epithelioma of the Gasserian ganglion, acute ascending paralysis of the cord, and carcinoma of the rectum. It is also stated that the lesions of Van Gehuchten and Nelis are not well marked in the early stages of the disease. It seems, then, that the rabic tubercles of Babes, while frequently found, are not constant. The various phases of cell degeneration, such as chromatolysis, granular degeneration, loss of nerve processes, and the various stages of cell destruction are in-

teresting to observe in connection with the pathology of the disease, but they can scarcely be made the basis of diagnosis, since they may be caused by other poisons. Further, owing to the great liability of the nervous system to rapidly undergo post-mortem change, together with the frequent production in it of artefacts from rough handling and improper fixatives, we have still further reasons for considering these minute changes as unreliable for diagnosis under the conditions which we have to meet practically.

Assuming that the lesions of Van Gehuchten are more constantly found in rabies, the great difficulty of the dissection of the intervertebral and plexiform ganglia makes this method undesirable, to my mind, as a routine method of diagnosis.

More recently, in 1903, Negri, of the University of Pavia, has made important observations on the pathology of rabies, describing minute bodies, since called Negri bodies, or corpuscles, which are found chiefly as cell inclusions in the Purkinje cells of the cerebellum and in the large ganglion cells in the region of ammons horn. Negri and some others believe these bodies to be the causative factor in the disease, and classify them among the protozoa. While not attracting much attention at first, these bodies have been studied and reported on latterly by a large number of observers, and they have become the basis for a method of diagnosis in a number of laboratories. Briefly described, these bodies may be said to be minute structures, varying in size from one to twenty-three microns in diameter. The shape is round or oval, but may be quite irregular. The staining reaction is eosinophile. In structure they may be homogeneous, ring formed, or vacuolated. They may contain irregularly grouped granules, or they may present a certain definite structure, namely, that of a mass of protoplasm containing one or more nuclear-like bodies surrounded by circular unstained areas. This structure has also been demonstrated by Dr. Williams of this laboratory in stained smear preparations. A preliminary report of her work will be found on page 476. They have been seen in the hanging drop as well as in stained preparation. They are said to preserve their form in spite of putrefaction of the brain, after prolonged immersion in glycerin, and after several days' drying. From personal experience, I can state that they may be found after such marked post-mortem change has oc-

curred as to render the nerve cells themselves unfit for the histological study of their own structure. Further, I have found them easily in a brain packed in ice for forty-eight hours and which had become completely frozen. These bodies are not found in the salivary glands.

As to the nature of these cell inclusions, suffice it to say that, while some believe them to be protozoa, others hold that they represent the degeneration of red blood cells, or of some of the cellular elements of the central nervous system. The following series will give an idea as to the frequency with which these bodies have been found. Taking the combined statistics of six European laboratories, we have a total of 550 observations. In 344 cases the lesions described by Negri were found. In every one of these cases the animal was proved to have rabies by the biological test. In 206 cases the lesions were not found. Out of this number, eleven cases were proved by inoculation to have had rabies. From these figures one may conclude that the finding of these lesions is practically conclusive evidence of the existence of rabies, and that in the failure to find them we have a possibility of error of about 5 per cent.

In investigating this subject at the Health Department laboratory, we have made use of material from the following sources, viz., 21 dogs, 24 guinea pigs, 10 rabbits, 3 horses, and 4 human cases. These figures represent the total number of cases of proved rabies as well as control cases. Of this number, there were 17 cases of rabies occurring naturally, *i. e.* from the bites of animals proved rabid. In 16 cases the disease was produced artificially in dogs, guinea pigs and rabbits, and 22 cases were used as controls. Of the 16 cases occurring naturally, 13 were dogs, 3 horses, and one a human case. All these cases showed the Negri bodies, the diagnosis being easily made by the microscopical method. By that I mean that after a search of about ten minutes at most of a single section of a small piece of either the cerebellum or ammons horn, or both, the diagnosis was made. In most of the cases a much shorter length of time was sufficient. In one of the experimental dogs the disease was produced by the inoculation of street virus in the region of a peripheral nerve, so that the condition would simulate that occurring naturally. This animal was allowed to go nearly to the time of death before being killed. The Negri bodies were found to be very numerous in the brain. Another

dog similarly inoculated was killed on the day he showed the first symptoms of nervousness. A careful examination of a section of both cerebellum and cerebrum failed to show the lesions, though it is possible that an examination of a number of sections might have revealed them. That the case was examined very early in the disease is shown by the fact that the submaxillary glands had not yet become infectious. By mistake, a portion of the brain tissue was not saved for inoculation. It may be said here that the majority of the dogs sent to the laboratory were killed during the course of the disease, some of them after only a day's sickness, yet the lesions were sufficiently pronounced to make the diagnosis easy.

In the rabbits and the guinea pigs the disease was produced by the subdural inoculation of the virus. All of these cases showed the lesions, but it is hardly fair to consider these cases as having equal importance with the others in estimating the diagnostic value of the method, inasmuch as it appears that there is a relation between the number of these bodies present in the brain and the proximity of the site of inoculation to the brain.

The control material was taken from the following sources: Five normal animals, three dogs suffering from unknown conditions, which were killed on suspicion of having rabies, but proven by animal inoculation not to have had the disease. In addition there were five cases of experimental diphtheria in guinea pigs, a case of staphylococcus infection including involvement of the brain in a rabbit, a case of general pneumococcus infection in man, one of traumatic cerebral hemorrhage in the human subject, and also one case of human tetanus and six cases of experimental tetanus in guinea pigs. In none of these cases was anything resembling Negri's corpuscles found, except in one of the cases of experimental tetanus. In this case there were a few minute eosinophile bodies occurring as inclusions in the Purkinje cells of the cerebellum. They showed no internal structure, and did not look exactly like even the structureless bodies found in rabies, and it is my feeling that one familiar with the appearance of these inclusions would not mistake them in making a diagnosis. However, it must be admitted that the similarity is sufficiently marked to be suggestive as to the nature of these cell inclusions. These diseases resemble each other in that in

both the virus travels by the central nervous system. We may suppose that all these inclusions—those showing the regular definite structure seen in rabies, together with the structureless forms seen both in rabies and occasionally in tetanus, are one and the same thing. In this case, of course, it must be assumed that they are all degeneration forms. Or it may be supposed that the structured forms found in rabies alone are the causative factor in this disease, while the other forms are the result of a poison acting especially on the nervous tissue and causing degeneration of its elements. So far as I know, the study of the morphology of these bodies has not progressed sufficiently far to throw light on this subject. However, as we are considering the diagnostic value of these lesions, it is to be noted, first, that even assuming their appearance identical in the two diseases, they are very commonly found in rabies, and are probably but rarely present in tetanus. Further, the dog, which is the animal most commonly afflicted with rabies, but rarely contracts tetanus. It would seem that much more extensive observation should be made on the histology of tetanus to clear up these points.

Even assuming that these lesions be definitely proven to be degenerations of the central nervous system, it seems quite possible that, when occurring in the numbers in which they do in rabies, they may still prove to be of great diagnostic value, since we must admit that, owing to the peculiar manner of transmission of the virus and the very long period of incubation and other peculiar features, this disease occupies a very unique position, and its pathology may be correspondingly unique.

With regard to the technique of the examination, one will find it necessary to take a small portion of the brain from both the cortex of the cerebellum and from the Ammon's horn, as the bodies are sometimes numerous in one region and not in the other. The tissue may be fixed in Zenker's fluid and stained with an eosin-methylene blue combination, in which case the inclusions stand out very clearly as red structures in the blue background of the cell body. Or absolute alcohol may be used as a fixative and hematoxylin and eosin as the stains. In this way a diagnosis may be made within twenty-four hours. The paraffin method of imbedding is to be preferred.

In conclusion, then, it would seem that in this method we have the means of making a rapid diagnosis, which is of about the same grade

of accuracy as that laboratory diagnosis of tuberculosis or diphtheria. That, further, the lesions are, as a rule, found early in the disease, and are not affected by changes in the brain tissue incident to the delay of shipping the material to the laboratory from a distance.

Further, the material for examination is easily obtained, and may be collected by any competent veterinarian and sent in the fixing reagent to the laboratory, thus saving time.

While further work on control diseases should be done to establish fully the standing of the method of Negri, it seems fair to conclude, from what has thus far been done, that we have in it a means of accomplishing what has long been sought, namely, a rapid diagnosis of rabies.

THE SMEAR METHOD AND FROZEN SECTIONS IN THE DIAGNOSIS OF RABIES.

By Ira Van Gieson, M. D.,

Assistant Bacteriologist.

During the past year experiments were made toward perfecting a method of rapid diagnosis of rabies in detecting the Negri bodies in smears of the central nervous system. It was thought that frozen sections of the brain might combine the advantages of the squeeze smear method with the natural topographical distribution of the Negri bodies which is somewhat disturbed in making the smear. After several trials, however, with variations of the Bevan Lewis method in which the sections of the congealed (but not frozen) brain tissue are immediately stained and dried on the slide, this procedure was abandoned. It was no comparison to the perfect demonstration with appropriate staining in the smear method, either for rapid diagnosis or detailed structural study of the Negri bodies. Frozen sections with similar technique of the salivary glands in various dogs revealed no traces of the Negri structures. Examinations also of the choroid plexus, pia mater, hypoglossal and motor oculi nerves, with methods similar to the smear procedure, yielded negative results as regards Negri structures.

The possibilities of the smear method in diagnosis in unfavorable material is shown in the instance of a dog received from Nanticoke, Pa., on February 8. The dog had been dead eight days; the dog's head was frozen stiff; the brain was solid, brittle and fragile. It was impossible to subject it to the smear manipulation. The brain could not even be removed without destroying all semblance to its topography. Accordingly the skull with partially exposed brain inside was placed on the radiator, and in three hours it had sufficiently thawed out into a partially grumous mass to permit of the smear procedure. In spite of these unfavorable conditions the first smear examined, which must have been from the neighborhood of the crucial fissure and motor zone—from the presence of the large Betz cells—showed the Negri bodies distinctly, although considerably deteriorated in the finer structural elements.

A few provisional experiments were made in connection with the smear method to determine the persistence of the Negri bodies. This is a matter of practical importance, since not infrequently animals suspected of rabies are sent to the laboratory for diagnosis a considerable length of time after death. Fortunately the morphologic diagnostic factor in rabies—the Negri bodies—show considerable resistance to postmortem changes. Brains removed from street rabid dogs were kept in the ice box and examined at intervals for the Negri bodies by the smear method. The bodies, though much deteriorated in structure, could still be recognized 8 and 9 days after death, although at this period the brain had begun to undergo bacterial decomposition.

THE ROUTINE METHODS IN THE TREATMENT AND DIAGNOSIS OF HYDROPHOBIA USED IN THE DEPARTMENT OF HEALTH.

By D. W. Poor, M. D.

Assistant Bacteriologist.

Treatment—During the year 1905 there were treated 118 patients, an increase of 30 over the year 1904 and an increase of 50 over 1903. Of the 118 patients, 50 were treated at the laboratory, the other 68 having the treatment sent to them. Recently the treatment has been

changed slightly by intensifying it and lengthening the duration of it in severe cases to thirty days.

When the virus has been sent from the laboratory, each day's dose is mailed daily by special delivery. It is mixed with sterile glycerine and a somewhat longer and stronger treatment is given than would be the case if the patient were treated at the laboratory. The results have been as good in the patients treated away from the laboratory as in those treated here. Nevertheless it is recommended that severe cases be treated preferably at the laboratory, where this is possible. It is considered inadvisable to send the treatment in cases requiring more than two days for its delivery.

Diagnosis—The method of diagnosis by means of hardened sections of the brain, based on the discoveries of Negri, has been thoroughly tested, a portion of this work appearing in a reprint published from the Medical Record of April 15, 1905. This method had been found to be of considerable practical value, the time required for diagnosis being shortened to two days. This method of diagnosis has been materially improved upon by Dr. Williams, who has devised a method of examining smears made from the brain, the time required being shortened to an hour or even less.

Considerable work has been done in testing the therapeutic value of a protective serum in the treatment of hydrophobia. This work is not yet completed, but the results thus far obtained do not indicate the serum used to be of any value as an adjunct to the ordinary Pasteur treatment. In view of recent work with radium on the hydrophobia virus, experiments have been started in conjunction with Dr. C. B. Fitzpatrick along this line. A report of the work done to date follows:

A PRELIMINARY NOTE ON THE ACTION OF RADIUM UPON HYDROPHOBIA VIRUS.

By Dr. C. B. Fitzpatrick and Dr. D. W. Poor.

The encouraging reports of the investigations on the inhibitive effects of radium and its emanations upon the hydrophobia virus and upon the disease itself, as it occurs in experimental animals, has appeared to us to warrant further study of this subject.

Rehns[1] appears to have been the first to claim that the emanations of radium rendered the virus inert. Tizzoni[2] has made more extended studies of the effect of both the radium rays, and its emanations upon hydrophobia and its virus.

Tizzoni and Bongiovanni[1] state that the radiations of radium, rapidly decompose the fixed virus of rabies in vitro, and that when so exposed to these radiations, it loses its virulence after an exposure of two hours. They further state that the radiations have a similar effect upon the virus within a previously infected animal.

We have made two series of experiments with the virus in vitro, which appear to confirm to some extent these claims.

One-half of 1 c. c. of a fixed virus was placed in the bottom of a small tube. A small glass receptacle enclosing 100 milligrammes of the chloride of radium of 20,000 radio-activity of French manufacture, was suspended by means of a silk thread, so that the radium tube was placed directly within the center of the virus.

The virus was so treated for two hours.

Two guinea pigs were inoculated subdurally with this virus. Two controls being inoculated with fixed virus which had not been exposed to radium. The controls died one and two days earlier than the pigs which received the virus which had been exposed to the radium.

Both the untreated fixed virus and the radium virus were kept in the ice box over night before being inoculated.

TABLE I.

		Dec. 15.	Dec. 16.	Dec. 17.
Guinea pig I................	Inj. Dec. 9 with Radium virus	Somewhat weak.	Dead.	....
Guinea pig II..............	Inj. Dec. 9 with Radium virus..	O. K.	Irritable.	Dead.
Guinea pig III............	Control inoculated with fixed virus Dec. 9................	Dead.	....	....
Guinea pig IV............	Control inoculated with fixed virus Dec. 9................	Dead.	....	....

A second experiment was made with 10 milligrammes of a German bromide of radium of about 1,800,000 radio-activity contained within an aluminum tube, sealed at both ends. This was enclosed in a cellu-

1. Compt. rendus hebdomadaires de la Societe de Biologie, 18 mars, 1905.

. Acad. des Sciences de Bologne, au seance der 9 avril et dur 28 mai, 1905.

loid tube and placed in the middle of 1 c. c. of fixed virus, contained in a small test tube for two hours. This virus was then injected subdurally into guinea pigs and two controls were similarily injected with ordinary fixed virus. The controls died sooner than the ones inoculated with the radium virus, as indicated by the following table:

	Dec. 20.	Dec. 25.	Dec. 26.	Dec. 27.	Dec. 28.
Guinea pig I..	Inoculated with radium virus.	Apparently well.	Sick.	Dead.	....
Guinea pig II.	Inoculated with radium virus.	Apparently well.	Slightly weak.	Sick.	Dead.
Controls Guinea pig III	Inoculated with ordinary fixed virus...............	Apparently weak.	Sick.	Dead.	....
Guinea pig IV Controls	Inoculated with ordinary fixed virus...............	Slightly weak.	Sick.	Dead.	....

These two experiments seem to indicate that a two-hour exposure of a fixed virus (made from the cord in the dilution of about 1 part cord to 10 of salt solution), to the radiations of radium, renders it less active than the ordinary fixed virus of a similar dilution, which had not been exposed to radiations of radium.

Attempts were also made to treat animals sick with hydrophobia and which already showed some symptoms. Contrary to the reports of curative effects made by Tizzoni, we were not able to note any effect upon the course of the disease.

TABLE III.

		Dec. 21.	Dec. 22.	Dec. 23.
Rabbit I—Sick, 7 days after inoculation with fixed virus.....	German radium of 1,800,000 radio-activity applied Dec. 20 to cornea of eyes alternately for one hour, then placed in position on cornea of right eye and left in piace 18½ hours	No change; weak.	Very weak.	Dead.
		Dec. 24.	Dec. 25.	Dec. 26.
Rabbit II—4 days after inoculation with fixed virus.	Same specimen of radium applied December 22 to cornea of eye for 18½ hours.........	No change; animal weak	Very weak,	Dead.

A further experiment was made in treating a guinea pig with beginning symptoms due to street rabies by placing a small sealed glass tube containing 100 milligrammes of French radium chloride of 20,000 radio-activity under the skin and subcutaneous tissue along the spinal column. The animal treated in this way died one day sooner than the control, indicating that the radium had had no effect whatsoever.

One rabbit was also treated by exposing the dura mater at the site of the inoculation with a trephine. Immediately after the inoculation with a 1-100 dilution of fixed virus a flat-faced, disk-shaped receptacle containing the radium was applied over the opening. The side of the disk applied to the wound was enclosed by a thin mica plate and covered with gutta percha tissue. The radium was kept in place six days and then removed. The animal died two days later. 10 milligrammes of radium bromide of 10,000 radio-activity were employed.

Two sets of experiments were also made in which the virus was exposed for a longer period than two hours. These experiments showed a very slight inhibitive effect from 15 hours exposure and no effect from a 21-hour exposure. The fifteen-hour experiment consisted in using 100 milligrammes of French radium chloride and exposing about 9 c.c. of fixed virus (diluted to 1 to 10 solution), to its action. A very slight inhibitive action was noted in this experiment, as indicated in the following table:

TABLE IV.

	Dec. 9.	Dec. 14.	Dec. 15.	Dec. 16.
Guinea pig I........	Radium virus inoculated..... .	Apparently well.	Weak.	Dead.
Guine II.......	" " "	"	Well.	Dead.
Guinea pig III.... Control.......	Fixed virus inoculated............	Weak.	Dead.	....
Guinea pig IV .... Control.......	" " "	Apparently well.	Weak.	Dead.

The 21-hour exposure consisted in using the 11 milligrammes of German bromide of radium of 1,800,000 radio-activity and exposing 9 c. c. of fixed virus (diluted to a solution of 1 part of cord to 10 of salt solution) to its action for 21 hours. Practically no inhibitive action was observed in this experiment as is indicated by the following table:

TABLE V.

	Dec. 21.	Dec. 27.	Dec. 28.	Dec. 29.	Dec. 30.
Guinea pig I......	Radium virus inoculated...	Dead.	....	....	....
Guinea pig II.....	" " " ...	Dead.	....	....	....
Guinea pig III Control	Fixed virus inoculated......	Very weak.	Dead.	....	....
Guinea pig IV. Control	" " "	"	Very weak.	Very weak.	Dead.
Guinea pig V....	Radium virus inoculated.	Apparently weak.	Paralyzed.	Dead.	....
Guinea pig VI....	" " " ...	Weak.	Completely paralyzed.	Dead.	....

Guinea pigs I. and VI. in the above table were inoculated with a mixture consisting of equal parts of ordinary fixed virus, and the 21-hour radium virus used to inoculate number I. and II. with the idea of determining if the radium virus neutralized the fixed virus, the experiment appears to indicate that it has no effect upon the fixed virus.

Further experiments were made with weakened and diluted virus, which had been exposed to radium and controlled by similar weakened and diluted virus with the provoking result that all the controls as well as the treated animals have as yet, at the end of one month, shown no symptoms of the disease. A cord dried three days was used to inoculate in the first series of these experiments, after being exposed to radium as indicated in Table I.

In the second series of these last experiments 8 fine needle drops of a solution, made up of 1 part cord and 200 parts of salt solution, was placed within a capsule of gutta percha tissue and placed on the thin mica plate covering 10 milligrammes of pure radium bromide of 10,000 radio-activity. This solution was exposed in this way in the ice box for five days and then inoculated.

In the third series of these dilution experiments, two gelatine rods covered with a covering of a radium in such a manner that the alpha, the beta and the gamma rays all act, were surrounded in a tube with 2 c.c. of the 1-200 dilution of the fixed virus. This solution was also exposed for five days. These rods are called Lieber rods. The radium is kept in place by a covering which permits all the alpha rays to act.

The glass tube in the first experiment cut off all the alpha rays, and only permitted some of the beta and most, if not all, of the gamma

rays to act. The aluminum, the mica, gutta percha and celluloid coverings in the other experiments excluded all the alpha rays, a little of the beta and permitted all of the gamma rays to escape and act upon the virus.

The final series of the experiments with the diluted virus consisted of the injection of a mixture containing equal parts of 1.200 diluted virus, and of a fluid provisionally called X solution. This solution contained the emanations of radium, termed D. E. and F. and a minute quantity of the radium itself, in alcoholic solution. This solution also contained all the different rays and was of strong radio-activity. This solution mixed with the diluted virus was also inoculated into two guinea pigs, which have remained well for 28 days. Unfortunately, as already related the controls have also remained alive and well and we are consequently unable to judge what the results have been.

ON THE PRESENCE OF CERTAIN BODIES IN THE SKIN AND BLISTER FLUID FROM SCARLET FEVER AND MEASLES.*

By Cyrus W. Field, M. D.

In December, 1903, Mallory[1] described certain protozoön-like bodies, which he had observed in the epithelial cells and in the lymph spaces of the skin, in material from autopsies on scarlet fever cases. He was unable to find them in the living patient.

At a meeting of the New York Pathological Society in April, 1904,[2] I reported that I had been able to find these bodies in the skin from five scarlet fever autopsies, but had been unable to find them in the skin taken from four living patients.

During the summer of 1904, Duval[3] obtained bodies similar to those of Mallory in blister fluid from scarlet fever patients. In looking over

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1. Mallory—*Jour. of Med. Research,* 1904, x., 483.
2. Field—*Trans. of the New York Path. Soc.,* 1904, iv., 50.
3. Duval—*University of Pennsylvania Med. Bull.,* 1904, xvii., 298; *Virchow's Archiv,* 1905, clxxix., 485.

Duval's specimens I was struck by the close resemblance of many of them to the extracellular forms of the malarial parasite, except that in Duval's specimens these bodies showed no chromatin. His specimens were stained with Wright's modification of Leishmann's stain, which, in my experience, does not always give a chromatin reaction.

Since April, 1904, I have taken skin from twenty scarlet fever patients, ten scarlet fever autopsies, fourteen measles patients, four measles post-mortems, four patients with antitoxin rashes, and from five autopsies on diphtheria cases which had had a rash before death. Skin was taken from two children, one of whom had died of broncho-pneumonia, the other of marasmus. The skin from each of these cases was divided into four parts and placed in Petri's dishes. One was kept in the ice box, one at room temperature, one at 37° C., and one at 56° C. While able to obtain many kinds of degeneration products in sections made from these specimens (removed from the Petri's dishes every twenty-four hours under the four conditions), I did not find a picture similar to that shown in the sections from the material taken after death from the cases of scarlet fever and measles. Though many of the epithelial cells showed masses of varying sizes in their protoplasm, these inclusions showed a difference in staining reaction, some being more acidophilic than the surrounding cytoplasm, others less so, while some are basophilic to a marked extent.

The histological technique followed for all the material was fixation in Zenker's fluid, imbedding in paraffine, and staining, with eosin and methylene blue, the sections being, on an average, four microns in thickness.

The bodies found in the material from scarlet fever and measles were the same, so far as I could determine, as those described by Mallory. Some were intracellular, others lay in the lymph spaces. For the most part they were made up of a delicate reticulum which stained a light blue, the surrounding protoplasm being pink. Only a very few showed the rosettes Mallory described as being so characteristic. In the sections from measles the bodies were not so focal in location as those in scarlet fever and were found more often in the lymph spaces of the corium; there were also small bodies which showed no reticulum but did show a central nucleus-like granule, these small bodies being

found not only in the autopsy material, but also in that from the living patient.

So I can report that in sections made from the skin obtained after death from all of the fifteen cases of scarlet fever I have been able to find Mallory's bodies. One of these cases was most interesting in that two specimens of skin were obtained, one within five minutes after death and the other twenty-four hours later; in the section made from the former, no bodies could be made out, but in that from the latter these bodies were easily found. In the twenty-four cases of scarlet fever, where the skin was taken during life, no bodies were found, except in one section, where it was thought a single small body was seen, but as I have been unable to find it again, this cannot be considered a positive observation. In the material from the four autopsies on cases of measles, cellular inclusions were found in three, one being negative. In the last case the skin was taken one-half hour after death, and no other specimen could be obtained. In the material from the fourteen living patients no such bodies as Mallory describes were found, but all showed the small round nucleated bodies. The specimens of skin from the antitoxin rashes were negative, both from the living and the dead patient.

Study of Blister Fluid.

Methods—The method used to obtain blister fluid was that devised by Duval except for a slight modification. A square of adhesive plaster two and one-half inches in size was covered with vaseline on its adhesive side, leaving a margin of one-half inch. A piece of blotting paper one-half inch in diameter and saturated with aqua ammoniæ fortior was placed in the center of this square, and the whole applied closely to the skin so as to admit no air. After being on from five to seven minutes, the skin was then exposed to the air, when in a short time a blister formed. The fluid was withdrawn from the blister with a sterile capillary tube. Moist spreads were made by blowing a drop of the fluid upon a clean slide and then placing on it a clean cover slip, under which the fluid was thinly and evenly spread. Smears were prepared and were fixed in absolute methyl alcohol for two minutes, some being fixed while dry, others while still moist. I did not find that it made any material difference as to which method was used.

In examining the smears many different stains were used, including a number of the various modifications of the Nocht-Romanowsky stain. In my experience Giemsa's[4] stain was most satisfactory, and Hasting's[5] was almost as good. Hasting's stain was slightly modified; instead of using 100 c. c. of methyl alcohol to dissolve the dye, I used 50 c. c. of glycerin heated to 60° C., and to this I added the dye, and then 50 c. c. of methyl alcohol which had been previously heated to 60° C. This idea was obtained from Giemsa's method. It permits of a greater concentration of the dye and the glycerin seems to prevent a deposit on the surface of the glass. In using these stains, it is well to over-stain and then decolorize in from fifty to seventy-five per cent. ethyl alcohol or in absolute methyl alcohol which gives a clearer picture.

Blister fluid was taken from eighteen cases of scarlet fever and from fourteen cases of measles. The bodies of Mallory were found in all the cases of measles and in fourteen out of the eighteen cases of scarlet fever.

Control Material—As control material blister fluid was taken from the following cases:

One case of erysipelas.

One case of eczema.

One case of erythema multiforme.

One case of urticaria.

One case of congenital syphilis.

One case of syphilis in the papular stage.

One case of irritated normal skin.

One normal individual.

One case of morbiliform antitoxin rash.

Seven cases of scarlatiniform antitoxin rash.

Material from pustules of two smallpox patients was also examined.

No bodies were found in the blister fluid from any of the above cases except in the last four of the scarlatiniform antitoxin rashes which were studied. In these four cases the blistering fluid was left on the skin for a longer period and caused a more severe irritation.

4. Giemsa, von—*Cent. für Bakt.*, 1902, xxxii., Abt. 1, 307, and 1904, xxxvii., Abt. 1, 308.

5. Hastings—*Bull. of the Johns Hopkins Hospital*, 1904, xv., 157; *Journal of Exper. Med.*, 1905, vii., 265.

In the material from these cases, bodies were found which it was impossible to differentiate from those found in the blister fluid of measles and scarlet fever. In one case after withdrawal of the material a moist spread was made and examined at once. Only a very few of the bodies were found, but a number of leucocytes were present. After six hours in the thermostat the preparation was examined again when many more of these bodies could be demonstrated. On making a smear and staining with Giemsa's solution, these bodies were indistinguishable from those in the blister fluid of cases of measles and scarlet fever. In these diseases, the bodies are found in the fluid as soon as the rash appears, but not before, and they can be found from four to six days after the appearance of the rash, but as soon as the rash fades away they disappear, becoming fewer and fewer until the sixth day, after which time not one has been observed. If two blisters are applied for from five to seven minutes to one patient, one blister being over a portion of the rash and the other on an area that has no eruption, the bodies can be found in the fluid over the rash; they are also present, though less numerous, in the fluid from the normal skin if the area is blistered for twice as long. The blister fluid from the rashes of both the measles and scarlet fever patients contained many more leucocytes than that from the other sources.

Conjunctival secretions from twelve cases of measles were examined. In the two cases where bodies similar in appearance to those in the blister fluid were found, there were numerous leucocytes, whereas in the ten negative cases the leucocytes were very few in number.

The Bodies—In smears of blister fluid stained with Giemsa's solution bodies of various kinds are found. The ones most commonly met with are those having a pale pink body with dark brown or black granules scattered throughout their substance. While many of these are undoubtedly red blood cells, or fragments of protoplasm of degenerating leucocytes, others are coagulated proteid, because similar structures can be found in smears made from horse serum which contained no cellular detritus. The bodies in which most interest centers are those which have the appearance of protozoa, many of them resembling closely the extracellular forms of the malarial parasite. These bodies have a pale blue protoplasm with one or more granules; the granules, which in

staining resemble chromatin, vary in size from a mere point to a particle taking up half of the total diameter of the body. Four times these bodies were found with the granules arranged about the periphery of the cell and with fine lines running to the center of the body, which gave them the appearance of a malarial rosette. The bodies ranged in size from one to fourteen microns in diameter, the majority being between three and seven microns. Those containing two or more granules were, as a rule, larger than those containing only one. In the moist spreads these bodies contained granules, dancing around in the protoplasm generally faster than the pigment of the malarial parasite. The morphology of these bodies in moist spreads and stained smears was therefore very strongly suggestive of protozoa.

The origin of these bodies, or bodies indistinguishable from them, was clearly made out. Leucocytes were very numerous in the moist spreads, particularly in those made with material from the acute exanthemata. When these spreads were watched in the warm box at 37° C., the pseudopodia of the leucocytes were seen to break off and in a short time assume a round form, each fragment containing one or more granules. When the pseudopodia which contained nuclear material had separated from the leucocytes and had assumed a regular outline, they resembled very closely individual cells. The reason the protoplasm of these bodies takes the weak basic dye instead of the acid dye is probably due to some chemical change that occurs when it separates from the cell. In some cases this protoplasm may be composed of nuclear material. In some of the stained smears leucocytes were found of which the protoplasm assumed this pale blue color, and in which the nucleus was undergoing karyorrhexis; this would indicate a degenerating cell. The nuclear fragments still gave the characteristic chromatin stain. Bodies of the same nature have been found when an emulsion of leucocytes in salt solution was left in the incubator for forty-eight hours, the salt solution having been previously diluted so as to make it hypotonic. The degenerating cells when stained gave some very beautiful pictures. (The differences in nuclear staining are shown in Plate XXVIII, Figs. 31, 32, 33, 34 and 38, *Journal of Experimental Medicine,* Vol. VII., No. 4, 1905.)

In this connection it may be of interest to note that Gotschlich,[6] in a recent paper entitled "Ueber protozoen Befunde (Apiosoma) im Blute von Flecktyphus-Kranken," describes a parasite which he claims to be that of typhus fever. The "parasite" according to his description seems to be very similar to the bodies described by Duval in the blister fluid of scarlet fever and by myself in the same fluid from scarlet fever and measles. In an excellent study of the "Blood Changes in Typhus Fever," by Love,[7] this author believes the parasite of Gotschlich to be nothing but degenerative changes in the red blood cells, and advances excellent arguments in favor of this hypothesis.

Conclusions.

I believe that the bodies found in sections of skin from cases of measles and scarlet fever are part of the protoplasm of the epithelial cells which has been so changed in its chemical nature that its staining reaction differs from that of the surrounding protoplasm. The small round extracellular bodies found in the living patients may arise from degenerating cells, but I cannot demonstrate this origin with certainty.

In sections of control and normal skin, the nuclei of the epithelial cells were often indented by the cell protoplasm, giving them an appearance similar to those indented by Mallory's bodies.

It would seem that if these bodies of Mallory's were protozoa they would have been found in the sections from both the living and the dead skin of scarlet fever and measles, as they were present in the blister fluid. Their absence is certainly more suggestive of a degeneration than of a protozoön. This view is also borne out by the fact that they were not found immediately after death, but were present in another specimen from the same case removed twenty-four hours later.

It would seem probable also that the bodies found in the blister fluid were the products of degeneration and cytolytic activity, because they were found in the antitoxin rashes as well as in the cases of scarlet fever and measles.

The histological changes in the skin of these two diseases leads us to expect the presence of cytolytic products both in the blister fluid and in the sections.

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6. Gotschlich—*Deutsche med. Wochenschr.*, 1903, xxvi., 329.
7. Love—*Jour. of Path. and Bact.*, 1905, x., 296.

It certainly cannot be stated that none of these bodies is a protozoön, but it can be positively stated that a great majority of them arise from degenerating cells; and in many cases, I think, it is not possible to differentiate a degeneration from a protozoön by the study of its morphology and staining reactions.

The bodies present in blister fluid resemble very closely those granular bodies found in blood under certain conditions, and seen in vaccine lymph and in emulsions of tissues and in exudates. I think, therefore, that they are for the most part, if not wholly, products of degenerating tissue cells and of leucocytes, and within certain limits specific to scarlet fever and measles.

THE CONCENTRATION OF ANTITOXIN FOR THERAPEUTIC USE.

By Robert B. Gibson, Ph. D.,

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The Department of Health of New York City since July 1st has been using extensively, and lately almost exclusively, an antitoxic fluid for diphtheria prepared by a concentration and purification of antitoxic serum. Accordingly some statement as to the nature of the product is desirable. A description of the process may serve the additional purpose of drawing attention to a subject which has of late been somewhat in the background. Both difficulties in the technique of handling the blood proteids and the general confusion of our knowledge of the serum globulins have discouraged to some extent the practical application of proteid chemistry to the concentration of diphtheria and tetanus antitoxins. That an artificial concentration is practicable has been experimentally demonstrated in this laboratory, where such a process has become a part of the routine work in the production of antitoxins.[1]

The serum proteids precipitable by saturation with magnesium sulphate or by half-volume saturation with ammonium sulphate are of three general types—the fibrinogen, the eu- or more typical globulin, and the water-soluble or pseudoglobulin. Some confusion exists as to whether the term "euglobulin" is to be considered as that portion of

[1] From July 1st to December 31st about 60 liters of concentrated serum were prepared in the Research Laboratory and distributed for the use of the Department.

the serum proteids (exclusive of the fibrin precursors) precipitated by saturation with sodium chloride alone, or to that thrown out of solution by 36 per cent. volume saturation with ammonium sulphate—a concentration of the salt sufficing, according to Pick,[1] to differentiate chemically certain of the antitoxins and other immune substances associated with or actually comprising the serumglobulins. All the evidence at hand is in favor of the serumglobulin nature of antitoxins and some of the related bodies. The antitoxin of diphtheria developed by the immunization of the horse has every character of the soluble globulin in the serum from this animal. A concentration and purification of the antitoxic substance, at least until proteid chemistry is much farther advanced, must, therefore, be based on the separation of this soluble globulin.

The more recent attempts to characterize and differentiate individual serumglobulins have as a basis the association of various immune substances with the proteid precipitates obtained under certain conditions. Thus Belfanti and Carbone[2] found that diphtheria antitoxin was carried down in the globulins obtained by salting out with ammonium and magnesium sulphates, but not with the precipitates obtained by acetic acid. Dieudonne[3] had previously shown that the proteids thrown out of solution by acetic and carbonic acids contained none of the antitoxin. Seng[4] found that diphtheria antitoxin is precipitated along with the soluble globulins. Atkinson[5] in this laboratory saturated with sodium chloride a solution of the moist serumglobulin precipitate obtained with magnesium sulphate, and by then employing heat differentiated the proteid into several fractions, all of which contained antitoxin; the protective properties corresponded quantitatively to the serumglobulin precipitates. Alteration of the proteid in the fractions by the addition of more of the sulphate produced proportionate changes in the distribution of the antitoxin. Brodie[6] had previously carried out experiments somewhat similar to Atkinson's with similar results. Pick,[7] on the con-

[1] E. P. Pick, *Beiträge z. Chem. Physiol. u. Path.*, i, p. 351, 1901.

[2] Belfanti and Carbone, *Centralbl. f. Bakteriol.* (Ref.), xxiii, p. 906, 1898.

[3] Dieudonné, "Ergebnisse der Sammelforschung über das Diphtherie Heilserum," *Arbeiten aus dem Kaiserlichen Gesundheitsamt*, xiii, p. 293, 1897.

[4] Seng, *Zeitschr. f. Hyg.*, xxxi, p. 513, 1899.

[5] Atkinson, *Journ. of Exper. Med.*, v, p. 67, 1901, and some unpublished experiments; see also Park, *Archives of Pediatrics*, Nov., 1900.

[6] Brodie, *Journ of Path. and Bact.*, iv, p. 460, 1897.

[7] Pick, *loc. cit.*

trary, divided the serumglobulin into two parts by ammonium sulphate fractioning; with the one or the other of these fractions individual immune bodies were always associated. Pick ascertained that the fraction of the horse serum containing no antitoxin was precipitated by 36 per cent. volume saturation of ammonium sulphate solution; the protective portion then came down on the further addition of the precipitant to 44 per cent. Spiro[1] found that the difficultly-soluble globulin (obtained by dialysis) was precipitated by half saturation with potassium acetate. Using the method of Pick, Spiro associated the antirennin of horse serum with the euglobulin, which he considers identical with the half-saturation potassium acetate precipitate. Freund and Joachim[2] examined yet more closely the precipitation characters of Pick's fractions, finding for both the eu- and the pseudo- globulins soluble and insoluble parts. By the study of the precipitation limits of a number of immune substances, Porges and Spiro[3] (without giving any of their experimental work) divide the serumglobulins into three distinct fractions, whose ammonium sulphate precipitation boundaries overlap unless the serum is greatly diluted. As the result of recent criticism, however, the differentiation of several soluble globulins is none too firmly established.[4]

The constant occurrence of the immune substances with the serumglobulins has suggested that these are actually a part of the one or the other of the globulin fractions. An increase in the globulin content of the blood as the result of immunization (Atkinson[5] and others) is indicative of the serumglobulin nature of these bodies. Joachim,[6] however, considered he found, in a single observation, that the increase was manifested in the non-protective fraction. Glässner,[7] in a very recent paper, also states that immunization can be accomplished without any essential globulin change.

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[1] Fuld and Spiro, *Zeitschr. f. physiol. Chem.*, xxxi, p. 132, 1900.

[2] Freund and Joachim, *ibid.*, xxxvi, p. 407, 1902.

[3] Porges and Spiro, *Beiträge z. chem. Physiol. u. Path.*, iii, p. 277, 1903.

[4] The purity of such ammonium sulphate fractions has recently been questioned by Haslam (*Journ. of Physiol.*, xxxii, p. 267, 1905); Osborne and Harris (*Am. Journ. of Physiol.*, xiii, 1905) have emphasized the untrustworthiness of this salt for theoretically differentiating proteids according to their precipitation limits.

[5] Atkinson, *Journ. of Exper. Med.*, v, p. 47, 1901.

[6] Joachim, *Arch. f. d. ges. Physiol.*, xciii, p. 558, 1903.

[7] Glässner, *Zeitschr. f. exp. Path.*, ii, No. 1, 1905.

Attempts[1] to isolate and establish the non-proteid nature of diphtheria antitoxin and the other immune substances from the standpoint of their digestibility by trypsin have not given satisfactory results. These bodies appear to be very slowly attacked by this enzyme—a character that is possessed in a like degree by serumglobulins and is independent of the occurrence of an antitrypsin.[2]

In addition to the globulin separations of the type already discussed,[3] methods especially directed towards isolating diphtheria antitoxin have been suggested. These include precipitation along with metallic hydroxides,[4] combined sodium and potassium chloride separations,[5] throwing down the antitoxin with zinc salts,[6] and lastly by precipitating out the non-antitoxic proteids with potassium alum, and subsequently separating the globulins remaining in solution.[7]

The methods which have been proposed for the isolation or concentration of antitoxins, then, are for the most part peculiar and tedious ways by which the " globulins " were finally separated from serum and milk. Evaporation and freezing [8] have been employed for concentration, but the use of these methods has not been continued. Pick states that by the isolation of his pseudoglobulin or higher ammonium sulphate fraction it is possible to concentrate the protective properties in a diluted serum ten to fifteen times. Pick's method is superficially the most practicable. Considerable quantities of antitoxin, however, may be carried down with the non-protective fraction[9] on third saturation with ammonium sulphate solution (Brieger).

There is little record of the actual experimental administration of purified antitoxic globulins. Park[10] studied the possibility of eliminating serum rashes by treating a considerable number of cases with an anti-

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[1] Belfanti and Carbone, *loc. cit.;* Pick, *loc. cit.;* Brieger, *Festschrift für R. Koch*, Jena, 1903.

[2] Oppenheimer, *Beitrage z. chem. Physiol. u. Path.*, iv, p. 279, 1903.

[3] Brieger and Ehrlich, *Zeitschr. f. Hyg.*, xiii, p. 336, 1893; Wassermann, *ibid.*, xviii, p. 236, 1894.

[4] Aronson, *Berl. klin. Wochenschr.*, 1894, p. 425.

[5] Brieger and Boer, *Zeitschr. f. Hyg.*, xxi, p. 259, 1896; Astros and Rietsch, *Compt. Rend. Soc. Biol.*, lii, p. 337, 1900.

[6] Brieger and Boer, *loc. cit.*

[7] Freund and Sternberg, *Zeitschr. f. Hyg.*, xxxi, p. 429, 1899.

[8] Bujwid, *Centralbl. f. Bakt.*, xxii, p. 287; Ernst, Coolidge, and Cook, *Journ. Boston Med. Soc.*, ii, p. 166, 1898.

[9] Some experimental observations on this subject showed me that antitoxin in a relatively large amount may be carried down with the lower fraction on third saturation with the sulphate. If the serum has been diluted several times, the precipitation results in a less noticeable loss.

[10] Park, *loc. cit.*

toxic globulin prepared by Atkinson. Rashes were still produced. The therapeutic effects were no better than were obtained with ordinary serum, and the use of the separated product gave on the average no better results than the whole serum.

It is important at this point to emphasize the difference between *concentration* and the *practical concentration* of antitoxins. In the latter case the antitoxic globulins must be so prepared as to be ready for immediate administration; the sterility of the solution must be absolutely insured; the product must preserve its clarity better than ordinary serum, and when administered should cause no more irritation locally. If rashes can be altogether eliminated, or at least lessened, so much the better. Further, the keeping qualities must be unimpaired or improved. The method of concentration must be comparatively simple, certain and inexpensive.

Narrowed down by the conception of the proteid character of antitoxins, an artificial concentration for the present must consist in a separation of the antitoxic globulins. A concentration of more than three or four times is hardly practicable, for there is a limit to the amount of proteid which can be dissolved and to the viscosity of the fluid which can be sterilized through a Berkefeld filter. Failing to find Pick's fractioning entirely satisfactory, I precipitated the serum with an equal volume of saturated ammonium sulphate solution, filtered and extracted the residue with a saturated solution of sodium chloride. The antitoxic globulin is easily dissolved in the chloride solution in spite of the ammonium sulphate present, the non-soluble proteids (globulins, nucleo-proteids, etc.) sedimenting on standing. After filtering, the sodium chloride solution of the antitoxic globulins is precipitated by the addition of a half volume of saturated ammonium sulphate solution, or, better still, with acetic acid in the usual manner. The filtered precipitate is pressed dry with paper and dialyzed in parchment. If the acid precipitation has been employed, the globulin solution is neutralized in the course of the first few hours of dialysis, which is continued for from two to three days. Sterilization is accomplished by a double filtration through Berkefeld filters, one-half per cent. of sodium chloride being added and a preservative used. The potency of the product is ascertained, it is tested bacteriologically, and is finally injected into animals

and actually administered at the Department of Health hospitals before distributing.

The sodium chloride separation here suggested is to be preferred, in my opinion, to a simple precipitation or fractioning with ammonium sulphate. With the additional acid precipitation, almost all the sulphate is removed before dialysis. The resulting dilution is about the same as when the sulphate is employed. The antitoxin is practically all recovered and a concentration of between two and three times the original potency is easily and constantly obtained. The sodium chloride separation is a sharp one, the two groups of proteids showing essentially different physical characters as precipitates. The final product is no more viscous than ordinary serum; it is almost colorless, or tinged with hæmoglobin. When dried down at low temperature a beautifully transparent and entirely soluble scale antitoxin can be obtained. Large quantities of serum can be worked over at comparatively small expense.

Tests show that the artificially concentrated antitoxin, kept in small vials in an ice box in the usual way, preserves its potency as well as the ordinary antitoxic serum. Therapeutically the results obtained are practically identical with the beneficent effects commonly observed. Local irritation is no more marked and rashes seem to be less frequent and severe when the refined antitoxin is administered. Hundreds of cases have been treated with this product in the Department hospitals, yet no infection for which the antitoxin is responsible has resulted.

The method of separation is possible and practicable largely because of the extreme solubility of the antitoxic globulins and the remarkable retention of this character when compared with the behavior of other proteids under the same conditions. When precipitated with ammonium sulphate of only a fair degree of purity and when treated with saturated commercial sodium chloride solution, the moist precipitate retains its solubility for weeks. The soluble globulin can be repeatedly precipitated and purified to a high degree. The antitoxic properties follow this soluble globulin at every step and are lost or lessened only by such agents as can considerably modify the character of the proteid.

The highly purified soluble globulin, when practically salt-free, is in part precipitated by the addition of distilled water, when the reaction is appropriate; a trace of sodium chloride present brings the proteid

again into solution. Of practical importance, perhaps, is the fact that it is precipitated by the addition of an equal volume of alcohol—a resulting concentration in which sodium chloride is easily soluble. These and other chemical characters of the soluble globulins will be more fully discussed in a subsequent paper.

We are at present engaged in a study of the cause of serum rashes, etc., with preparations of the antitoxic globulins purified to a high degree. Some results already obtained with fairly pure experimental products indicate that the separation of the insoluble globulin does not by any means suffice to eliminate these deleterious effects. An 800-unit antitoxin preparation, fractioned and reprecipitated with ammonium sulphate solution, and subsequently extracted, first with acidified, and then with neutral saturated sodium chloride, dialyzed, and made slightly alkaline, produced a considerable number of severe rashes. It seems possible that the rash production in this instance was associated with some irritation due perhaps to a slightly excessive degree of alkalinity. I have also observed development of rash following the administration of an unneutralized acetic acid preparation of the antitoxic globulin. From the extensive use of ten of the latest routine preparations regarding which clinical reports have been received a very few mild urticarias only have resulted; in all of these preparations, the reaction (to litmus) has been neutral or but very faintly alkaline. The decrease in the frequency and severity of these effects reported from the Department hospitals has been very encouraging.

A more detailed technical description of the method of concentration which I have introduced into this laboratory follows. It is perhaps unnecessary to emphasize the care which should be exercised in working with any proteid solution which is to be injected for therapeutic purposes. Precautions which are of course second nature to the proteid chemist, may be neglected by assistants or others unfamiliar with this line of work. Serious consequences may follow any mistake.

For concentration, antitoxic serum of almost any grade or quality is serviceable; probably citrate, or other plasma could be used with success. Material of a low grade of protective power (150 to 250 units), old and returned stock, as well as highly potent serum, are all utilizable

As deterioration is probably the result of autolytic processes,[1] just as concentrated preparations can be obtained from the old and returned stock as from the fresh serum.

Ten to fifteen liters of serum are precipitated by the gradual addition with stirring of an equal volume of saturated ammonium sulphate (Merck's pure crystalline, at ten cents per pound). After standing an hour or two the precipitate is collected on large folded papers on ribbed funnels. The precipitates are again dissolved in ten to twelve liters of water; the resulting solution is reprecipitated with ammonium sulphate solution in a volume equal to that of the water added. The precipitated globulins are once more collected on filters and then treated with twice the original serum volume of saturated sodium chloride solution. The sodium chloride extract is allowed to settle over night, and the supernatant solution of the antitoxic globulins is siphoned off and filtered. The insoluble residues are again extracted with salt solution, and the washings are combined with the first sodium chloride extract of the succeeding antitoxin preparation.

The sodium chloride extract is completely precipitated now either by the addition of about half its volume of saturated ammonium sulphate solution, or better, by the addition of about 0.25 per cent. of acetic acid. The final precipitate is filtered off. When sufficiently drained, the proteid and the containing papers are dumped on mats of filter paper so that the folded filters are extended into a semicircle, while still holding the somewhat moist, soft, globulin precipitate. These precipitates are pressed out simply by occasionally changing the absorbent paper wrapped about them. When freed mechanically from the adherent folded hardened filters, the precipitate is placed in a bag of heavy parchment paper and dialyzed over night in running water; it is then neutralized if the acid precipitation has been employed. Dialysis is continued in running water for from two to three days or longer, toluol or chloroform being added as a preservative.

After filtering the dialyzed solution through paper pulp, it is roughly sterilized through a Berkefeld after about one-half per cent. of sodium chloride (c. p.) has been added. The antitoxin globulin solution is

[1] Atkinson noted a decrease in the magnesium sulphate precipitable globulins of old serum, the potency of which had deteriorated correspondingly.

again sterilized by a filtration through a second Berkefeld. A preservative is finally used. In filtering the first few cubic centimeters should be discarded or turned into the next preparation.

The protocols of two of the earlier experimental preparations and of a subsequent concentration are given below. No attempt was made to make the chemical technique a very careful procedure—*i. e.,* the insoluble globulin precipitates were not thoroughly extracted, etc. As it is, they show at least about four-fifths of the antitoxic property recovered:

Preparation XV. 9000 c.c. serum; potency 200, net total antitoxin (corrected for two large samples taken during preparation)	1,672,000 units.
Final product (500 units per c.c.)	1,400,000 "
Preparation XVI. 9000 c.c. serum; potency 300; total............	2,700,000 "
When neutralized after 18 hrs. dialysis 2620 c.c. (900 units)......	2,358,000 "
Final product, 3320 c.c. 700 units per c.c......................	2,324,000 "

Preparation AIV. 60 liters serum, potency about 275, were concentrated to a final volume of 19 liters, potency 800 units per c.c.

It is frequently stated that artificial concentration of antitoxin is superfluous, because it is possible to immunize animals to such a high degree that any further procedure is unnecessary. The production of a highly potent serum in any horse, however, is an uncertain process. For this purpose only 25 per cent. of the horses tried by us are serviceable, and even if suitable, the horses can be used for only a few months when the immunization is forced to produce a grade of 500 units per cubic centimeter. An artificial concentration of low-grade serum is possible probably at no more, and perhaps even less, expense than obtains in the present procedure for producing an equally potent antitoxin; considerable saving may also result from utilizing serum of a grade below 200 units, as well as the returned serum, which is at present usually destroyed. A further reduction of expense by working over citrate-plasma instead of serum is possible. Again there may arise occasions in any serum laboratory when the production of a supply of highly potent antitoxin at short notice is most desirable. For circumstances of this character an available method for artificially concentrating the protective properties of serum might be of considerable service.

[1]Oppenheimer. *Toxine u. Antitoxine,* 1904, p. 87.

The elimination of the serum rashes, even in part only, makes the expense question almost a negligible factor in the concentration and refining of antitoxins.

The work so far done and planned is somewhat comprehensive in scope and is both practically and scientifically important. It has to do not solely with the concentration of antisera and the elimination of the serum rashes, etc., but may also throw some light on the chemical characteristics and the nature of antitoxins and related substances, and on the probable functions of the so-called "serumglobulins."

In concluding, I desire to express my thanks to Dr. William H. Park, director of this laboratory, for his active and helpful co-operation.

SOME NOTES ON THE CONCENTRATION OF DIPHTHERIA TOXIN.

By Edwin J. Banzhaf,

Assistant Chemist, Research Laboratory.

Last summer we experienced some difficulty in producing a diphtheria toxin of such a strength that one cubic centimeter contained from 200 to 300 minimial lethal doses for 250 gram guinea pig in four or five days, which has been the usual strength used by us in injecting the horses.

Toxic fluid of half this strength necessitates injections of twice the amount and over. This, in cases of horses highly immunized, amounts to a liter or more for each injection per horse, causing at the seat of injection marked inflammation and swelling, which sometimes results in the formation of abscesses. After a few months of repeated large injections, the tissues become indurated, and the horses suffer in general health. Injected into a horse, the same number of guinea pig fatal doses, when in a concentrated solution, yield a higher grade of antitoxin in a given time than the same number of guinea pig fatal doses in a dilute solution.

In consequence of this, the study of concentration of the diphtheria toxin was taken up.

Since December, 1905, by a process of concentration (alcohol precipitation), I have eliminated a large part of the non-toxic constituents

of the diphtheria toxic broth; thus concentrating the toxin 10 to 20 times. This is shown by the following examples:

From 12 liters of diphtheria toxin, strength 25 M.L.D. per c.c., obtained a product of 542 c.c. strength 500 M.L.D. per c.c. A loss of about 10 per cent. toxin.

From 10 liters of diphtheria toxin, strength 50 M.L.D. per c.c., obtained a product of 453 c.c. strength 1000 M.L.D. per c.c. A loss of about 10 per cent. toxin.

From 8 liters diphtheria toxin, strength 100 M.L.D. per c.c., obtained a product of 600 c.c. strength 1200 M.L.D. per c.c. A loss of 10 per cent toxin.

We have immunized four new horses at the antitoxin station with a concentrated and refined toxin, containing 500 M. L. D. per c.c. The results of these are as follows:

Two of the horses responded remarkably well, yielding, the one, a serum containing over 1,400 units per c.c. and the other, a serum of over 1,300 units. The other two horses produced so little antitoxin that they were not continued in the service.

The first named horses have continued producing strong antitoxin and have kept in remarkable physical condition despite the oft-repeated bleedings. It is probable that this is largely due to an elimination of deleterious substances in the toxic bouillon.

REPORT ON THE DIPHTHERIA ANTITOXIN HORSES.

By Edwin J. Banzhaf,

Assistant Chemist Research Laboratory.

The total production of diphtheria antitoxic serum for 1905 amounted to 442,755 cubic centimeters. This amount was produced from 20 horses. Seven of these horses had only one bleeding, and of these seven, four died soon after their initial bleeding. The other three were new horses, having entered the antitoxin station in August, 1905, and being bled for the first time in December.

Horses 239, 244 and 246, which entered the antitoxin station October 12, 1903, January 15, 1904, and January 19, 1904, respectively, produced during the spring and summer of 1904, a high grade antitoxic serum,

the quantity of which, however, diminished very rapidly toward the close of the year. After the second bleeding of this year, horses 239 and 244 died, and after the fourth bleeding, horse 246 died.

Horses 269 and 270, which entered the antitoxin station May 24, 1904, died after the fourth bleeding of this year.

Horse 234, the oldest diphtheria antitoxin horse at present in use, entered the antitoxin station August 18, 1903, and has produced a fairly high grade antitoxic serum for a period of 26 months. The two last bleedings of this horse December 26, 1905, and December 29, 1905, gave 550 and 450 units per cubic centimeter, respectively.

Horses 262 and 264, which entered the antitoxic station on February 12, 1904, and Feburary 26, 1904, have produced high grades antitoxic serum for a period of 18 months. Their two last bleedings, December 26, 1905, and December 29, 1905, gave 550 and 450 units per cubic centimeter, respectively.

The bleedings from January to July of this year averaged 400 units per cubic centimeter. From July to December of this year considerably less.

The large amount of antitoxic serum of 300 units and under, was due to frequent bleeding of the horses after July of this year.

This low grade serum was utilized by concentration as is discussed elsewhere in this report. (See Dr. Gibson's article.)

The following table gives the production and strength of the diphtheria antitoxic serum obtained from the horses during the year.

Entered Antitoxic Station.	Number of Horse.	Number of Bleedings.	Total Diphtheria Antitoxic Serum. C. C.	500 Units or Over per C. C.	400 to 500 Units per C. C.	300 to 400 Units per C. C.	Below 300 Units per C. C.	Remarks.
August 18, 1903	234	11	60,540	6,540	20,970	27,880	5,150	Still in use.
October 12, 1903	239	2	7,240	....	....	4,080	3,160	Died May 12, 1905.
January 14, 1904	244	2	10,100	....	....	4,940	5,160	Died April 17, 1905.
January 19, 1904	246	4	21,000	....	15,030	5,970	....	Died May 12, 1905.
February 12, 1904	262	13	70,085	11,160	11,510	24,140	23,275	Still in use
February 26, 1904	264	11	40,740	8,040	10,430	14,930	7,340	Still in use.
April 16, 1904	268	11	36,380	12,920	14,000	6,730	2,730	Still in use.
May 24, 1904	269	4	17,560	4,850	7,820	4,890	....	Died May 15, 1905.
May 24, 1904	270	4	19,120	5,960	5,350	3,790	4,020	Died May 12, 1905.
October 31, 1904	271	9	43,110	....	6,530	24,280	12,300	Still in use.
October 31, 1904	272	8	36,215	3,950	8,930	4,610	18,725	Still in use.
December 22, 1904	273	1	3,390	....	....	....	3,390	Died July 31, 1905.
May 11, 1905	280	1	7,640	....	....	7,640	....	Died Sept. 18, 1905.
May 22, 1905	282	1	4,370	....	....	4,370	....	Died Dec. 29, 1905.
July 6, 1905	284	5	14,190	....	....	7,390	6,800	Still in use.
July 28, 1905	285	5	24,535	5,460	5,540	13,535	....	Still in use.
August 12, 1905	286	1	5,010	....	....	....	5,010	Still in use.
August 14, 1905	287	1	12,540	....	....	12,540	....	Died Dec. 7, 1905.
August 21, 1905	288	1	5,250	....	....	5,250	....	Still in use.
August 21, 1905	289	1	3,740	....	....	....	3,740	Still in use.
	20	96	442,755	58,880	106,110	176,965	100,800	Died during the year. 9.

THE VALUE OF DIPHTHERIA ANTITOXIN IN THE TREATMENT OF DIPHTHERIA AS ESTABLISHED BY TEN YEARS OF TRIAL.

By William H. Park, M. D., and Charles Bolduan, M. D.

It seems wise before entering on a consideration of statistical and other reports to consider certain facts which should be understood in order to make such a study valuable.

The history of the disease now known as diphtheria goes back to the remotest times, descriptions of the malady being found in the writings of some of the old Greek writers. Even during recent years the disease in its different localizations in the body has been known under different names, and this must be recognized or very faulty conclusions may be drawn.

In 1765 Francis Horne, M. D., of Edinburgh published a pamphlet entitled, "An Inquiry into the Nature, Cause and Cure of Croup." The word "croup" at that time was the term given to diphtheria, the Scotch word "croup" meaning to croak or to speak with a harsh voice. Horne's account of the autopsy findings would describe the cases as met with to-day and is extremely interesting.

In 1771 Dr. Samuel Bard of New York wrote an elaborate article on the "Cause, Nature and Treatment of Suffocative Angina." His description of the disease which we at once recognize as diphtheria is extremely vivid, but his knowledge of the etiology is somewhat vague.

The present name was given to the disease by Bretonneau in 1821. His observations were so extensive and so correct that little advance in knowledge took place until the causal relations of the diphtheria bacilli and their associated microorganisms to the disease began to be recognized.

In the official death returns in New York we first find the term diphtheria used in 1857, when two deaths are reported as due to this disease.

The following table is of interest as showing the names under which formerly the disease was undoubtedly returned in New York, and how the use of the term diphtheria rapidly spread.

Year	Inflammation of Throat.	Inflammation of Tonsils.	Quinzy.	Sprue.	Ulceration of Throat.	Angina.	Croup.	Diphtheria.	Totals.
1851	53	..	..	78	5	38	462	....	636
1852	50	..	..	33	20	43	595	....	641
1853	107	..	..	43	5	16	502	....	673
1854	118	23	..	90	12	10	637	....	772
1855	64	13	..	66	10	12	639	....	804
1856	50	8	4	49	7	14	550	....	682
1857	71	15	10	36	7	21	560	2	622
1858	70	15	2	56	7	11	478	5	644
1859	111	4	3	24	19	58	622	53	894
1860	132	..	6	15	..	37	599	422	1,211
1861	101	..	..	25	17	16	460	453	1,072
1862	68	..	..	27	7	2	685	594	1,383
1863	49	..	..	14	25	64	908	981	2,041
1864	18	..	1	4	8	37	754	781	1,603
1865	..	..	..	4	24	5	449	534	1,016

So far as the change in nomenclature is concerned it may be well to quote the Registrar General's Report for England and Wales, 1898. The conditions described therein undoubtedly apply to a greater or less extent to all other cities and countries:

"With regard to the changes that have taken place from time to time in the nomenclature of diphtheria it is important to bear in mind the following points: 1. Diphtheria as a distinct affection had scarcely been recognized in England previous to 1855, in which year this disease was for the first time separated from scarlet fever in the national records of the causes of death. 2. The great diphtheria epidemic of 1858-9 was preceded by a marked increase in the mortality from croup and quinzy, by a still greater increase in the mortality from cynanche maligna, and also by some increase in that from laryngitis. 3. The diphtheria epidemic of 1863 was accompanied by parallel movements in the mortality ascribed to croup and also in that ascribed to

cynanche maligna. 4. The incidence of croup in regard both to season and to the ages of death of those attacked is found to have been similar to that of diphtheria. 5. Whereas the deaths attributed to croup in 1861-70 were more numerous by one-third part than those attributed to diphtheria, the deaths attributed to croup in 1896-98 were less than one-sixth part as many as the deaths attributed to diphtheria. These facts taken in conjunction afford statistical support to the current medical opinion as to the identity of the two diseases, and certainly warrant the assumption that by far the greater number of deaths hitherto attributed to croup have really been caused by laryngeal diphtheria. * * *

"At the present day the proportion of deaths attributed to 'croup' is relatively so small as to scarcely affect the rate. This is especially true for London, where the mortality from 'croup' barely exceeds 3 per cent. of that from diphtheria."

This gradual change in nomenclature is well shown by a table giving the annual average rates of mortality for each of several groups of years in England and Wales (Registrar General's Report 1898). The figures are per 1,000,000 inhabitants.

Periods.	Diphtheria.	Croup.	Diphtheria and Croup.	Laryngitis.	Sore Throat and Quinzy.
1861–1870	185	246	431	51	14
1871–1880	121	168	289	48	10
1881–1890	163	144	307	54	24
1891–1895	254	70	324	48	21
1896–1897	269	43	312	44	19
1898	244	27	271	38	17

This change is particularly well shown in the table given on page 516 (1851-1865) and by the following continuation also from the New York City records:

Year.	Croup.	Diphtheria.	Approximate Ratio.	Year.	Croup.	Diphtheria.	Approximate Ratio.
1858	478	5	96.0:1	1878	499	1,007	......
1859	622	53	12.0:1	1879	522	671	......
1860	599	422	1.4:1	1880	910	1,390	......
1861	460	453	1.0:1	1881	1,038	2,249	......
1862	685	594	1.1:1	1882	729	1,525	......
1863	908	981	.9:1	1883	644	1,009	......
1864	754	781	......	1884	748	1,090	.....
1865	449	534	......	1885	855	1,325	......
1866	368	435	......	1886	968	1,727	......
1867	338	251	......	1887	889	2,167	......
1868	342	276	......	1888	639	1,914	......
1869	483	328	......	1889	605	1,686	......
1870	421	308	......	1890	521	1,262	......
1871	466	238	......	1891	609	1,361	0.4:1
1872	675	446	......	1892	670	1,436	0.4:1
1873	732	1,151	0.6:1	1893	588	1,970	0.3:1
1874	594	1,665	0.5:1	1894	511	2,359	0.2:1
1875	758	2,329	0.3:1	1895	342	1,634	0.2:1
1876	527	1,750	0.3:1	1896	208	1,555	0.1:1
1877	472	951	0.5:1				

The following table illustrates a similar change in nomenclature in Boston. (John McCollom, Boston Medical and Surgical Journal, June, 1905.) Taking the yearly percentages of the deaths from diphtheria and croup to the total mortality we get the following:

Year.	Diphtheria.	Croup.	Year.	Diphtheria.	Croup.
1879	5.285	2.081	1885	3.472	1.299
1880	6.892	2.180	1886	3.519	1.014
1881	6.665	2.229	1887	3.137	.933
1882	5.091	1.300	1888	4.609	1.167
1883	4.568	1.673	1889	5.498	1.160
1884	3.585	1.475	1890	3.938	.599

Year	Diphtheria.	Croup.	Year.	Diphtheria.	Croup.
1891	2.194	.501	1898	1.562	.138
1892	3.684	.596	1899	2.480	.242
1893	4.064	.597	1900	4.598	......
1894	7.092	.529	1901	3.124	......
1895	5.190	.582	1902	1.730	.319
1896	4.435	.481	1903	......	......
1897	3.684	.403			

In other words, whereas, the proportion of croup to diphtheria was formerly from 1 :3 to 1 :4 it has fallen to 1 :9 to 1 :10 or more.

The Influence of Bacteriological Examinations on Diagnosis.

In 1883 Klebs demonstrated the existence of a bacillus in the false membrane of diphtheria. In the following year Löffler isolated and cultivated this organism. Since that time the term diphtheria has been limited to an exudate or pseudo-membranous inflammation characterized by the presence of the diphtheria bacilli.

With the increase in our knowledge we have learned that a very similar clinical and pathological picture can be produced by other bacteria, especially by streptococci. The more severe of these cases were formerly classed as diphtheria and require to be regarded in any statistical study. The less severe cases as well as the milder cases of true diphtheria were in some cases classed as diphtheria and sometimes as not according to the learning of the physician. It is disputed by many whether the bacteriological diagnosis adds to or diminishes the number of cases classed as diphtheria. It is certain that some very mild sore throats which would not clinically be classed as diphtheritic are now often classed as diphtheria; on the other hand, however, there are many cases presenting well marked membranes on the tonsils and other clinical symptoms of diphtheria and many exudates complicating scarlet fever which bacteriological diagnosis throws out as cases not diphtheria.

In the Annual Report of the Health Department of the City of Boston, for 1905, this question is discussed as follows:

" In previous reports (1902-1903) calculations have been given to show by two different methods the probable error of the physician in

the purely clinical diagnosis of diphtheria. These calculations indicated that at least 38 per cent. of the cases reported without bacteriological examination as possibly diphtheria, are really not diphtheria. In Boston, from 70 to 80 per cent. of the total reported cases receive bacteriological confirmation. It seems clear that by means of cultures in Boston less cases remain under the designation of diphtheria than if these cases were judged solely on clinical evidence."

Our own opinion is that there is probably a slight increase in the number of mild diphtheria cases reported because of the making of cultures. These cases even if suspected to be diphtheria by the attending physician would otherwise often go unreported.

The Value of Hospital Statistics in Estimating the Results of Treatment.

A difficulty in estimating the effect of antitoxin hospital practice is the fact that in recent years many cases are sent to hospitals in some cities which formerly did not reach there, cases sent to prevent contagion. Thus in Berlin in 1884-1887 only 26-30 per cent. of the total number of cases of diphtheria were sent to hospitals. In 1897 there were 57 per cent.; in 1898, 60 per cent. and in 1899, 63 per cent. so treated. (Gottstein, Therapeut. Monatshefte, 1901, p. 605.) On the other hand, in New York there has been no increase of hospital facilities and there has been no appreciable change in the percentage of cases treated in the hospitals.

The Mortality in Cases Treated Early in the Disease as Contrasted with Those Treated at a Later Period.

In view of the inconclusive results of comparisons of case mortalities before and since the introduction of antitoxin treatment, as to the exact amount of improvement, a number of observers have sought to show the value of serum treatment by tabulating the days on which such treatment was begun and the corresponding mortality. The antitoxin being unable to materially influence diphtheria in the majority of cases after the fourth day. Thus Faber (Jahrb f. Kinderheilk, 1904. No. 59) publishes his analysis of 3,137 cases of diphtheria occurring in

the Blegdams Hospital in Kopenhagen. He excludes cases complicated with scarlet, whooping cough and other diseases unless these had already passed their height and were receding.

Commencement of Serum Treatment.	Number of Patients.	Number of Deaths.	Mortality.	Calculated Number of Deaths According to the Entire Mortality of the Growth (11.5 per cent.).	Difference Between Actual and Calculated Mortality.
1st day	99	7	7.1	11	−4
2d "	641	48	7.5	74	−26
3d "	763	69	9.0	88	−19
4th "	555	63	11.4	64	−1
5th "	334	52	15.6	38	+14
6th "	171	29	17.0	20	+9
7th "	80	17	21.3	9	+8
Later than 7th	196	39	19.9	23	+16
Unknown	298	35	....	....	....
Total	3,137	359	11.5	....	....

Average, 11.5 per cent.

Admission on the—	Mortality. Per Cent.
2d day of disease	19
3d " " "	24
4th " " "	38
5th " " "	30
6th " " "	21
7th " " "	41

Bing and v. Ellerman (Therap. Monatshefte, 1904, XVIII., p. 398) have critically studied a large number of cases with a view to refuting such an interpretation. They cite Heubner, who had caused the prognosis to be written opposite each history on the admission of the patient. The results showed that the patients admitted later were more apt to die mainly because they were admitted in worse condition than the others. Heubner's results may be tabulated as follows:

	Unfavorable Prognosis Per Cent. of Cases.
Admission on—	
1st day	6%
2d "	8%
3d "	14%
4th "	17%
5th "	22%
6th or 7th days	53%
8th and later	69%

Bing and v. Ellerman then give their own report on 1,356 cases of diphtheria from the preantitoxin days (1889 to 1894) occurring in the Blegdams Hospital in Kopenhagen.

	Number Admitted.	Of these there died.	Per Cent. Mortality.
Day of Admission—			
1	113	38	34%
2	494	110	22%
3	350	95	27%
4	177	68	38%
5	125	53	42%
6	54	22	41%
7	23	13	57%
8 and later	20	12	60%

They analyze their figures as follows:

"If the mortality is calculated for periods of 48 hours instead of 24 hours the irregularities disappear and one obtains the series 24, 31, 42, 58 per cent. At first sight one would be inclined to agree with Glaeser and others, especially when one remembers that in the last 10 years the mortality of diphtheria has been decreased only from 12 to 4 per cent. and that this decrease includes with the effect of treatment and the spontaneous decrease in virulence which the disease has under-

gone. If our curve of the preantitoxin day is compared with that of Jellineck from the serum period or with Faber's given above, one will notice that the rise of the curve is more rapid in the serum period. Furthermore in the serum period one does not see the relatively high mortality on the first day admission which we found."

The Seasonal and Climatic Occurrence of Diphtheria.

If we glance for a moment at the seasonal and climatic distribution of diphtheria, we find that although the disease has prevailed under all circumstances of climate, in the highest as well as in the lowest latitudes, along the coast as well as in the interior, it is particularly in the temperate and colder zones that it effects its greatest ravages. Even allowing for the defective data from equatorial and subtropical countries, we find that there the disease is quite rare.

Hirsch gives the following data regarding the incidents of season and weather which shows that even in temperate climates where diphtheria is prevalent in cold weather it is greatly lessened with the approach of summer.

	Period.	Season.			
		January to March.	April to June.	July to September.	October to December.
Sweden	1861–1870	31.0	20.9	19.0	29.1
Berlin	1876–1883	24.2	21.4	22.1	32.3
Saxony	1873–1878	28.7	17.6	17.7	36.0
Hamburg	1873–1882	23.9	24.2	21.7	30.2
Göttingen	1878–1882	33.5	22.4	19.5	24.5
Schleswig-Holstein	1872–1881	29.6	20.0	22.0	28.4
St. Petersburg	1878–1882	24.7	23.1	20.9	32.3
Frankfurt	1863–1883	27.3	24.7	19.6	28.4
Vienna	1863–1883	31.3	23.5	15.7	29.5
Philadelphia	1868–1875	24.0	21.4	18.5	37.1

These three-month periods, while they do show the lowest distribution of diphtheria in the third, *i. e.,* summer period, do not reflect the influence of weather as well as the following chart arranged by weeks.

This shows the deaths per 100,000 in New York (old city) in 1903 to 1905, inclusive. Since it is impossible to accurately reflect the meteorological conditions we have plotted on this curve the deaths from pneumonia and bronchitis. These ought to be a fair measure of the effect of the weather in producing colds or other diseased conditions of the respiratory tract. Any cold wet weather with slush in the streets is almost certain to be followed by an increase in inflammations of the respiratory tract and in diphtheria.

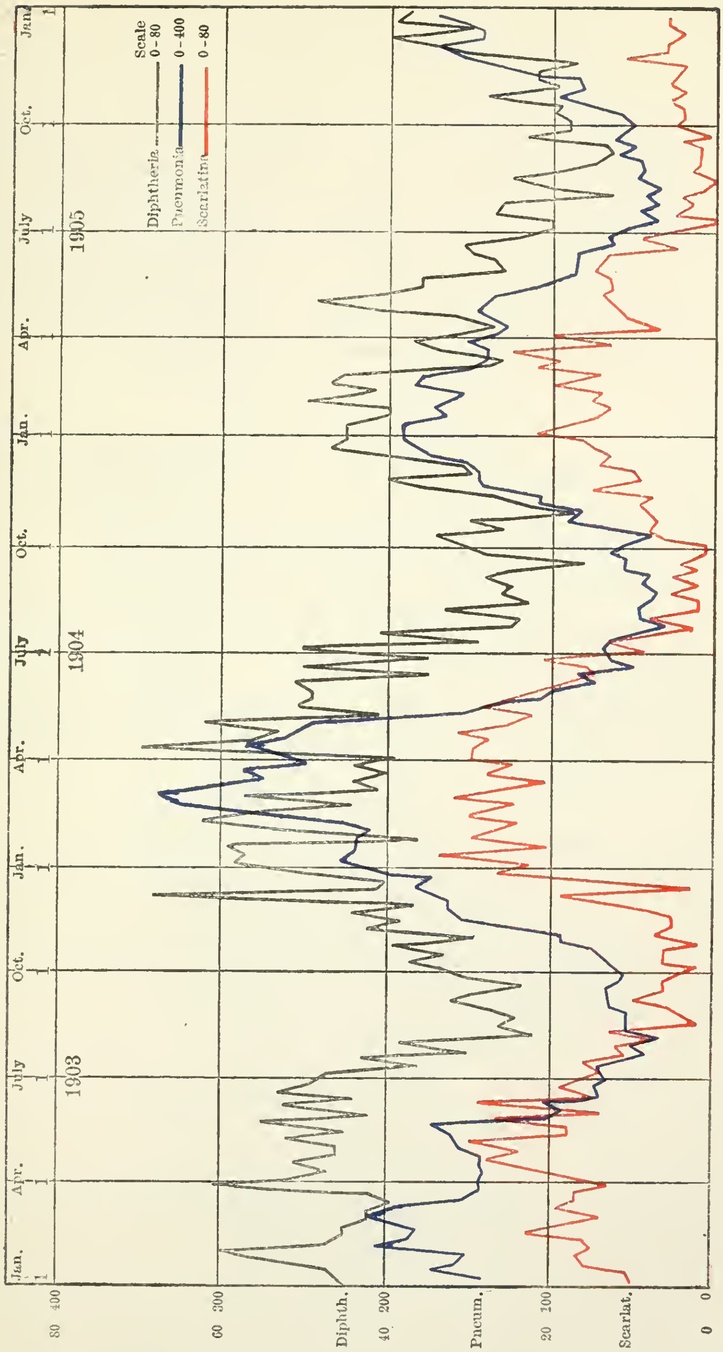

Scale
Diphtheria 0-80
Pneumonia 0-400
Scarlatina 0-80
1903
1904
1905
Jan.
Apr.
July
Oct.
Diphth.
Pneum.
Scarlat.
80 400
60 300
40 200
20 100
0 0

Fig. 1.

Here we see that the disease is at its ebb point during the middle of summer and gradually increases in extent from about the beginning of October. In this *rise* it follows rather closely the curve of pneumonia and bronchitis—*i. e.,* so far as we can tell, the effect of the weather. Again taking the pneumonia-bronchitis curve as an index, we see that although the effects of severe weather become much less about the first week in May, the curve of diphtheria continues for about a month longer. It is evident that this is due to the fact that the diphtheria bacillus is able in many to excite diphtheria without any aid from atmospheric conditions while the pneumo-coccus as a rule requires such assistance.

In the case of scarlet fever, Dr. A. Seibert has published charts showing that the prevalence of the disease coincides very closely with the sessions of school. In many years, however, this influence is not so noticeable although always an important factor.

To what extent this holds for diphtheria can be seen from our chart, which also has plotted on it the curve for scarlet fever. While the study of individual cases proves that the spread of diphtheria is aided by school attendance, the curve for large cities does not follow the sessions of school very closely as the weather is an even more important factor.

Characteristics of Epidemics.

Statistical studies in order to be of great value must embrace a sufficient period of years and a sufficiently large number of cases. This is particularly true of diphtheria, a disease which recurs in epidemic cycles of varying length. This is well shown by the following curves, perhaps the most accurate that can be found anywhere.

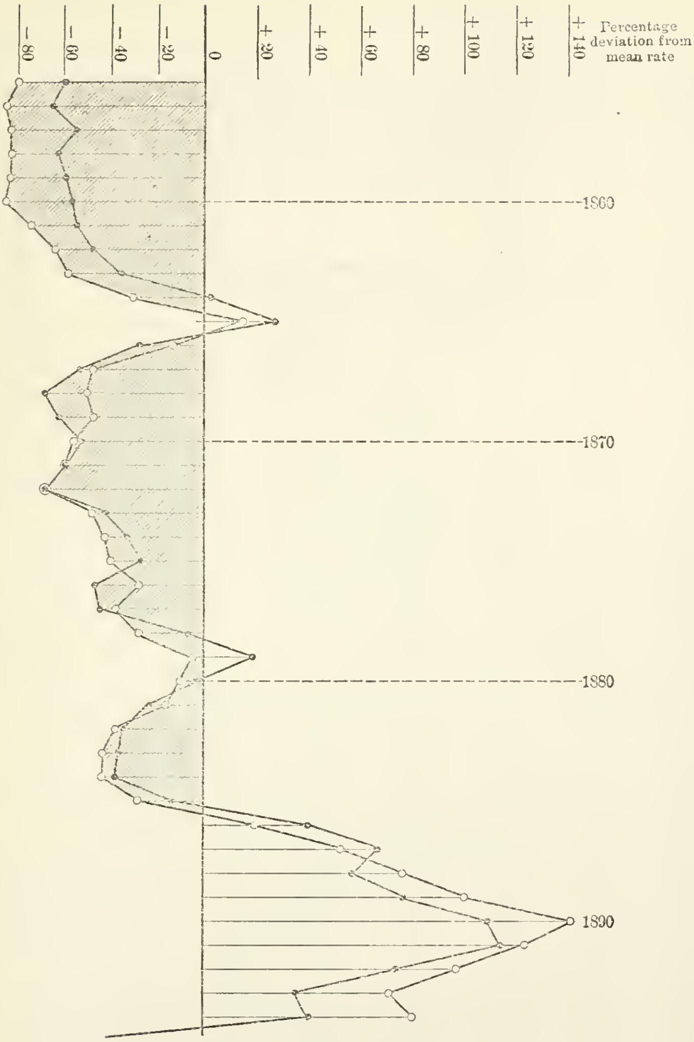
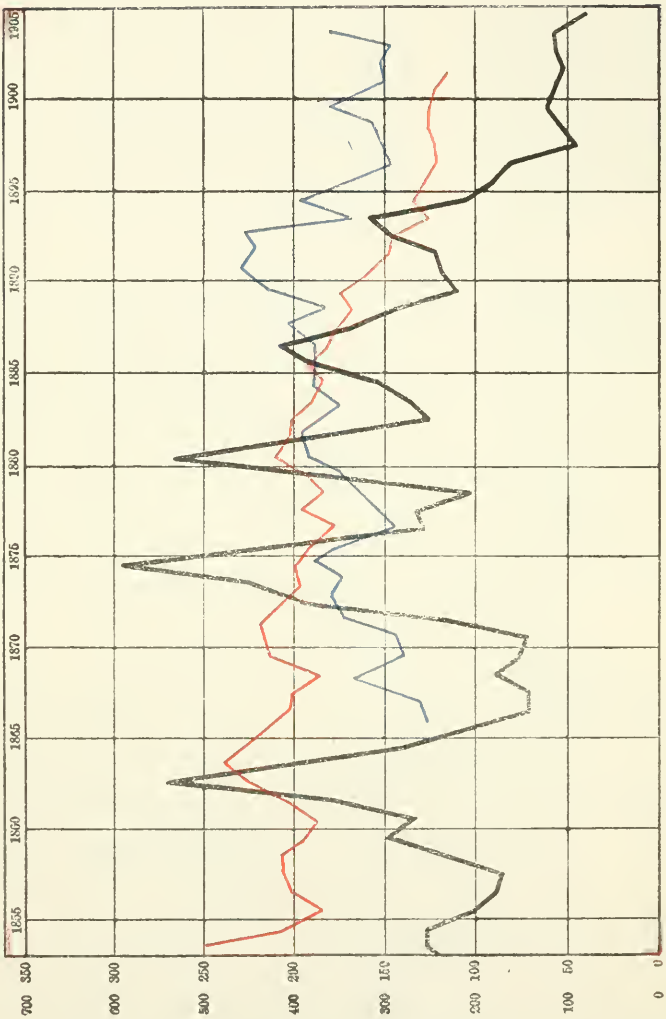


Fig. 2.

KOPENHAGEN : Cases and deaths from diphtheria, 1855-1895 ; their variation from the mean of the entire period. (After Newsholme.)



Diphtheria
Scale 0–350.

Phthisis
Scale 0–700.

Pneumonia and Bronchitis
Scale 0–700.

Fig. 3.

A word as to the latter chart:

For the period from 1853-1865 the deaths are all those given in the table on page 513, while from 1866 on, the figures include all the deaths reported as due to diphtheria and croup. During the early part of these years the deaths are undoubtedly understated, for we know that only about two-thirds to three-quarters of all deaths were really reported. For the past thirty-five years, however, the figures are probably very near the actual conditions.

In the case of these two cities, then, we see that there is an irregular epidemic recurrence at intervals varying from about five to ten years. The importance of knowing this cyclical recurrence will be discussed in connection with antitoxin treatment.

Mortality and Prevalence of Diphtheria at Different Ages.

Diphtheria is essentially a children's disease. This fact is emphasized by all writers. To be sure this does not mean that only children are attacked, for the disease is certainly not rare among adults. In fact, some of the earliest modern reports of diphtheria were from cases among the French troops in barracks.

On the whole, it may be safely said that during the first few months there is only a slight disposition for the disease. Toward the end of the first year, however, this disposition grows rapidly, increasing still more rapidly during the second year, so that from then until about the close of the fifth year the disease is at a high level. From then on the disposition drops, at first slowly, then more rapidly, so that from about the 14th or 15th year the disposition is again very slight.

The following figures show the age incidence of 2,711 *cases admitted* to Baginsky's children's hospital in Berlin from 1890 to 1897 inclusive:

	Cases.	Per cent.	Number who died.	Death rate per 100 admitted.	Death rate in the age class.
0 to 6 months	15	.55	4	0.15	26.6
6 months to 1 year	69	2.50	36	1.32	52.2
1 to 2 years	227	8.30	110	4.05	48.4
2 to 3 years	317	11.60	119	4.30	37.5
3 to 4 years	354	13.05	121	4.40	34.2
4 to 5 years	337	12.40	84	3.09	24.9
5 to 6 years	264	9.70	61	2.20	23.1
6 to 7 years	280	10.30	61	2.20	21.8
7 to 8 years	209	7.70	26	0.95	12.4
8 to 9 years	175	6.40	23	0.84	13.1
9 to 10 years	146	5.30	19	0.70	13.0
10 to 11 years	101	3.70	9	0.33	8.9
11 to 12 years	80	2.90	8	0.29	10.0
12 to 13 years	65	2.02	7	0.25	10.8
13 to 14 years	72	2.60	6	0.22	8.3
	2,711	....	694	....	*25.6

*Average.

The following table shows the age distribution of the *fatal cases* in New York City for ten years:

New York City—Deaths from Diphtheria, 1891-1900 *Inclusive—Age Distribution.*

	Female.	Male.	Total.	Per Cent. of Total.
Under 1 year	745	920	1,665	9.2
Between 1 and 2	1,998	2,265	4,263	23.6
" 2 and 3	1,872	1,945	3,817	21.2
" 3 and 4	1,412	1,488	2,900	16.1
" 4 and 5	960	948	1,908	10.6
Total under 5.	6,987	7,566	14,553	80.6

	Female.	Male.	Total.	Per Cent. of Total.
Between 5 and 10	1,681	1,371	3,052	17.0
" 10 and 15	131	110	241	1.3
" 15 and 20	31	29	60	
" 20 and 25	36	22	58	
" 25 and 35	49	46	95	
" 35 and 45	19	22	41	
" 45 and 55	13	16	29	1.7
" 55 and 65	9	7	16	
" 65 and 75	4	4	8	
" 75 and 85	....	....	....	
" 85 or over	1	....	1	
Total	....	....	18,003	....

In England the age distribution of nearly 70,000 fatal cases compiled by the Registrar General (Lancet, 1878) was as follows:

	Per Cent.
Under 1 year	9.0
From 1- 5 years	45.0
From 5-10 years	26.0
From 10-15 years	9.0
From 15-25 years	5.0
From 25-45 years	3.5
45 years and over	2.5

The youngest case of which we can find any record is one reported by Jacobi in a child 9 days old. Forest has recently reported three cases in young infants the ages of which were 19 days, 3 weeks, 11 weeks respectively (Archiv. f. Kinderheilkunde, Vol. XLII., No. 1 and 2.) We have met with two severe pharyngeal cases at an early age, 17 and 21 days respectively.

Sex seems to play no part in this disease, boys and girls are about equally attacked. Of the 2,711 cases above mentioned, 1,311 were boys and 1,400 girls. The mortality among the former was 27.9 per cent.; among the latter 23.2 per cent.

Infectivity and Virulence.

There is a considerable variation in the case of mortality at different times and in different places. This fact is particularly important in studying the influence of antitoxin on this disease, as will be discussed later.

First of all it is necessary to appreciate clearly that poison production and infectivity are two entirely independent properties. Thus a marked capacity for producing a severe attack of a disease may be associated with a very low degree of infectivity, while the presence of great power of infectivity in an organism or mixture of associated organisms does not imply that the average type of disease produced will be necessarily severe.

Eröss, in studying the statistics from a large number of Hungarian cities, finds that the case mortality in diphtheria is highest at the height of the epidemic, and that as soon as the disease loses its epidemic character, the case mortality drops to a low level. Newsholme, however, shows that this is not always the case, and presents a number of interesting tables which show the reverse behavior. Brownlee in an excellent paper on this subject states that the disease is as a rule most fatal in England in towns where it is least prevalent.

Results of Antitoxin Treatment.

A period of more than ten years having elapsed since the introduction of diphtheria antitoxin, it seems advisable to study the effect this treatment has had on the mortality from diphtheria.

On looking over the literature one finds that such studies have been made a number of times, and that many of them are exceedingly valuable. Nevertheless objections have been made, particularly by opponents of serum treatment, that such statistics are open to grave sources of error, and that the apparent improvement is only temporary. Instead of this contention receiving support as the antitoxin treatment extends over a longer period and becomes more general we find that in spite of temporary fluctuations the trend is always toward a lower mortality.

In the early period of antitoxin administration (in 1896) the American Pediatric Society collected reports on 5,794 cases of diphtheria treated with antitoxin. These showed an average mortality of 12.3 per cent.

Guerard, in Bulletin No. 3 of New York Health Department, collected reports of 9,893 cases treated with the serum, with an average mortality of 18.3 per cent. Of these cases 7,277 in which the mortality was 20 per cent. were returned by 53 hospitals; the reports from the same hospitals gave as their previous mortality an average of 44.3 per cent.

In the City of Boston, Ernst reports 1,156 cases treated by the serum, with 165 deaths, a mortality of 14.2 per cent. The report by McCollom from the diphtheria wards of the Boston City Hospital shows even better results. Of 844 cases treated by the serum, there were 96 deaths, a mortality of 11 per cent.; the previous mortality in the same institution without serum was 40 per cent.

Siegert tabulated the cases from 23 hospitals for children in Europe from 1890 to 1898 inclusive. Omitting 1894, the transition year, his figures are as follows:

Period.	Cases Treated.	Deaths.	Mortality.
Before serum, 1890-1893	16,585	6,889	41.3
After serum, 1895-1898	20,181	3,309	16.4

In the "Statistische Monatsschrift," 1902, quoted by Eröss (Jahrb. f. Kinderheilk., 1904, No. 60, p. 593), we find that in Austria in 1896-1899 of the patients treated with serum 14.5 to 15.1 per cent. died, while of those not treated 36.4 to 39.8 per cent. died, viz., 2½ times as many.

Bokay (Jahrb. f. Kinderheilk., 1904), in referring to diphtheria in Buda Pest, says that in 1891 out of 2,952 cases of diphtheria there were 914 deaths, 32.5 per cent. In the year 1903 out of 2,293 cases only 309 died, 13.5 per cent. By merely placing these two years side by side, he says there is enough statistical material to show the great value of serum treatment.

The above figures may be taken as an example of the "case-mortality method." It is open to several objections, chief among which is the

fact that what is now called diphtheria and membranous croup may or may not have been so designated formerly.

Operative Cases.

A comparison of the mortality in the operative cases is of particular interest, since these are always diphtherias of a severe type.

The following figures are compiled from Lovett and Munro,[1] Holt,[2] McCollom[3] and from our own official records:

Without Serum.

Intubations.	Without Serum.		
	Total Cases.	Died.	Mortality.
German authors	5,795	3,944	69 per cent.
German hospitals	3,063	2,124	70 "
British authors	433	295	69 "
French authors	9,242	6,834	76 "
American authors—private practice	5,625	3,848	68 "
Various countries	1,993	1,336	68 "
Boston City Hospital (23 years)	......	......	71 "

With Serum.

Intubations.	With Serum.		
	Total Cases.	Died.	Mortality.
Welch—European hospitals	342	112	29.8 per cent.
American Pediatric Society Report, private practice	533	138	25.9 "
McCollom—Hospital cases—Boston	1,553	683	44.0 "
New York Health Department, as below	1,660	723	43.5 "

New York Health Department—	Cases.	Deaths.
Tenement service, 1895-7	144	56
Tenement service, 1902-4	133	39
Diphtheria Hospital, 1901-5	1,341	614
Outside physicians, 1895-6	42	14
Total	1,660	723

[1] Lovett & Munroe. American Journ. of Med. Sciences, 1887. Vol. XCIV., p. 160.
[2] Infancy and Childhood. First edition, page 189.
[3] John McCollom. Boston Med. & Surg. Journal, Vol. CLII., No. 22, 1905.

The value of intubation in this disease is well shown by the following table of treatment with tracheotomy, but without serum.

	Total Cases.	Died.	Mortality.
German authors	5,795	3,944	69 per cent.
German hospitals	3,063	2,124	70 "
British authors	433	295	69 "
French authors	9,242	6,834	76 "
Various countries	1,993	1,336	68 "
American authors	1,327	1,015	77 "
	21,853	15,552	72 per cent.

The Simultaneous Observation of Cases Treated Without and With Antitoxin.

An absolutely ideal method is one made use of by Fibinger (cited by Faber, Jahrb. f. Kinderheilk 1904, No. 59). In this at the same time every other case was treated with antitoxin. He had 239 cases with antitoxin with mortality of 8—3 per cent.; 245 cases without antitoxin with mortality of 30—12 per cent.

This method however for obvious reasons is not available at this day. We once observed a similar test at the Willard Parker Hospital. The difference in the behavior of the cases was so greatly in favor of the antitoxin that the test was stopped and all cases put on antitoxin.

The Absolute Number of Deaths from Diphtheria Before and After the Introduction of Antitoxin.

Perhaps the least objectionable of all methods at present available is a comparison over a series of years of the absolute number of deaths per 100,000 for a long period of years before and after the introduction of antitoxin. Such figures moreover must be collected only from such cities where reliable statistics have been kept during the entire period and any extraneous factors, such as changes in nomenclature, the presence of epidemics must be known.

It was stated above that the statistics must be from a long period of years. While this of course is true for all kinds of statistics it is par-

ticularly important in diphtheria in which mortality figures move up and down irregularly in large waves. These irregularities, however, only become apparent when a considerable number of years is gone over. To give an example, in Baltimore in the six years ending 1882, the average of deaths per 100,000 from diphtheria and croup was always above 14 and reached 200 or over in three of those years. In the seven years following, the mortality fell sharply and continuously until it reached its ebb point in 1889, when it was 52 per 100,000, and yet no difference in treatment was introduced in 1883.

One must therefore be careful not merely to take readings which constitute part of an epidemic, unless due allowance be made for this fact. And in order to appreciate what an epidemic is, one must know the average number of deaths for many years back.

Statistics of this kind ought furthermore to be taken mainly from the large cities, for reports of deaths are usually but indifferently kept in the rural districts. Thus in some states the cause of death was often certified to the health authorities by the town supervisor, so that it happened that " sore inside," " chronic running sores " were occasionally given as causes of death. In some of these States only about two-thirds of the deaths have been regularly reported.

In the following pages statistics have been collected from a number of large cities on the continent of Europe, in Great Britain, and in the United States.

For purposes of comparison it will be perfectly fair to take the combined mortality from diphtheria and croup for the years of the preantitoxin period and compare this with that of the years since the introduction of antitoxin.

New York City (Present Boroughs Manhattan and Bronx).

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000
1851	538,490	636	118
1852	560,607	641	114
1853	583,632	673	115
1854	607,603	772	127
1855	632,559	804	127
1856	664,980	682	102
1857	699,062	622	90
1858	734,892	644	87
1859	772,558	894	116
1860	812,154	1,211	149
1861	794,905	1,072	135
1862	778,023	1,383	179
1863	761,500	2,041	268
1864	745,327	1,603	215
1865	729,498	1,016	140
1866	767,979	803	104
1867	808,489	585	72
1868	851,137	616	72
1869	896,034	813	90
1870	943,300	729	77
1871	955,921	704	73
1872	968,710	1,121	116
1873	981,676	1,883	192
1874	1,030,607	2,259	219
1875	1,044,396	3,087	295
1876	1,075,532	2,277	211
1877	1,107,597	1,423	128
1878	1,140,617	1,506	132
1879	1,171,621	2,300	190
1880	1,209,268	1,193	101
1881	1,244,511	3,287	264
1882	1,280,857	2,254	184
1883	1,318,264	1,653	125
1884	1,356,764	1,838	136
1885	1,396,388	2,180	158
1886	1,437,170	2,695	188

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000
1887	1,479,143	3,056	206
1888	1,522,341	2,553	167
1889	1,566,801	2,291	146
1890	1,612,559	1,783	110
1891	1,659,654	1,970	118
1892	1,708,124	2,105	123
1893	1,758,010	2,558	145
1894	1,895,353	2,870	158
1895	1,873,201	1,976	105
1896	1,906,139	1,763	91
1897	1,940,553	1,590	81
1898	1,976,572	923	46
1899	2,014,330	1,085	53
1900	2,055,714	1,276	62
1901	2,118,209	1,227	58
1902	2,182,836	1,142	53
1903	2,249,680	1,232	56
1904	2,318,831	1,272	57
1905	2,390,382	860	38

Antitoxin laboratory established in fall of 1894. Free distribution to the poor begun early in 1895.

The deaths classed in this table as due to diphtheria from 1851-1865 are only approximately correct. They include all the deaths during the period mentioned (1851-1865 inclusive), which were returned under any of the following heads: Angina, Croup, Diphtheria, Inflammation of Throat, Inflammation of Tonsil, Quinsey, Sprue, Ulceration of Throat. It is estimated that prior to 1851 not more than two-thirds of the deaths were registered. Since then conditions have gradually improved. It must also be remembered that scarlet fever and diphtheria were often confounded in these earlier days.

Brooklyn.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000
1878	536,561	861	162
1879	551,397	939	170
1880	566,663	1,538	270
1881	585,017	1,607	275
1882	603,926	965	160
1883	623,422	727	116
1884	643,487	665	103
1885	664,126	832	125
1886	707,092	1,185	167
1887	730,712	1,453	200
1888	755,145	1,265	164
1889	856,321	1,467	180
1890	894,024	1,283	152
1891	933,398	1,180	135
1892	970,046	1,137	126
1893	996,715	978	105
1894	1,060,000	1,660	173
1895	1,100,000	1,454	146
1896	1,125,000	1,310	127
1897	1,162,749	998	94
1898	1,197,100	745	68
1899	1,231,548	744	65
1900	1,169,000	863	73
1901	1,205,000	732	60
1902	1,243,000	762	61
1903	1,281,000	803	62
1904	1,321,000	706	53
1905	1,362,000	594	43

Antitoxin distributed gratis from the time of Brooklyn's consolidation with New York, in 1896.

Boston.

Year.	Population.	Deaths, Diphtheria and Croup.	Deaths Per 100,000.
1876	346,004	720	208
1877	350,138	471	134
1878	354,322	569	160
1879	358,554	545	152
1880	362,839	774	213
1881	368,190	802	217
1882	373,620	575	153
1883	379,129	608	160
1884	384,720	487	126
1885	390,393	459	117
1886	401,374	423	105
1887	412,663	410	99
1888	424,274	589	138
1889	436,208	683	156
1890	448,477	462	103
1891	457,772	285	62
1892	467,270	481	102
1893	476,270	546	114
1894	486,830	878	180
1895	501,083	588	117
1896	516,305	516	98
1897	528,912	411	77
1898	541,827	170	31
1899	555,057	277	49
1900	560,892	537	95
1901	573,579	353	61
1902	586,533	225	38
1903	600,929	214	35
1904	614,522	206	33
1905	595,000	132	22

REMARKS—Antitoxin laboratory established 1895. First serum issued September 1, 1905. Free distribution of antitoxin to poor since 1896. Its use was quite general even from the first. At present about 60 per cent. of all cases of diphtheria are treated in the hospital and receive antitoxin.

Philadelphia.

Year.	Population.	Deaths from Diphtheria.	Croup.		Total.	Deaths Per 100,000.
			Membranous.	Plain.		
1878	825,000	464	388		854	103
1879	835,000	321	291		612	72
1880	846,980	323	303		626	74
1881	868,000	457	317		774	90
1882	886,509	933	466		1,399	158
1883	907,041	1,006	500		1,506	166
1884	927,995	680	589		1,269	135
1885	949,432	600	753		1,353	143
1886	971,363	411	650		1,061	109
1887	993,801	416	442		858	86
1888	1,016,758	350	273		623	61
1889	1,046,964	375	352		727	70
1890	1,040,964	528	415		943	90
1891	1,069,264	918	444		1,362	129
1892	1,092,168	1,435	272		1,707	156
1893	1,115,562	916	273	79	1,238	110
1894	1,139,457	1,407	348	56	1,451	128
1895	1,163,864	1,020	329	49	1,398	120
1896	1,168,864	862	293	46	1,201	103
1897	1,214,256	1,231	243	40	1,514	125
1898	1,240,266	998	156	21	1,175	94
1899	1,266,832	849	144	21	1,014	80
1900	1,293,697	898	144	25	1,163	82
1901	1,321,408	525	118	18	661	50
1902	1,349,712	435	80	16	531	40
1903	1,378,624	521	87	22	631	46
1904	1,408,154	458	83	7	548	38
1905	1,438,000	...	....	...	462	32

Philadelphia has distributed antitoxin free of charge for use among the poor since 1896. For several years after this, however, its use was not general. Since about 1900, however, its use has extended, as is shown by the following figures there were supplied: 1896, 900 doses; 1897, 2,334 doses; 1898, 3,367 doses; 1899, 2,976 doses; 1900, 5,233 doses; 1901, 5,374 doses; 1902, 5,771 doses; 1903, 7,342 doses; 1904, 10,298 doses.

Baltimore.

Year.	Population.	Deaths from Diphtheria and Membrane Croup.	Croup.	Total.	Per 100,000.
1877	311,275	455	157	612	197
1878	318,182	303	149	452	142
1879	325,139	298	186	484	150
1880	332,313	293	173	466	140
1881	339,649	639	242	881	260
1882	347,142	707	222	929	265
1883	354,832	591	201	792	143
1884	362,668	343	127	370	102
1885	370,696	252	148	300	81
1886	378,903	190	128	318	84
1887	387,300	149	153	302	78
1888	395,899	118	98	216	54
1889	404,498	155	53	208	51
1890	413,671	274	45	319	77
1891	426,917	350	44	394	92
1892	440,163	381	47	428	98
1893	453,409	185	25	310	69
1894	466,655	198	33	231	50
1895	479,907	265	45	310	65
1896	493,147	249	32	281	57
1897	500,000 estimated	347	13	360	72
1898	505,000 "	362	50	412	81
1899	509,000 "	312	...	312	61
1900	513,000 "	267	12	279	54
1901	518,000 "	...	...	171	33
1902	525,000 "	...	...	130	25
1903	533,000 "	...	...	160	30
1904	541,000 "	...	...	115	21
1905	550,000 "	...	....	112	20

Pittsburg.

Year.	Population.	Deaths, Diphtheria.	Croup.	Total.	Per 100,000.
1878..................	145,000	483	12	495	340
1879..................	150,000	354	5	359	240
1880..................	156,381	311	missing	311+	200
1881..................	165,000	210	"	210+	130
1882..................	170,000	185	"	185+	109
1883..................	175,000	170	"	170+	98
1884..................	185,000	321	"	321+	180
1885..................	202,559	243	"	243+	120
1886..................	205,000	249	11	260	127
1887..................	210,000	281	103	384	183
1888..................	220,000	126	73	199	90
1889..................	230,000	333		333	138
1890..................	238,617	394		394	164
1891..................	247,000	388		388	157
1892..................	255,000	372		372	145
1893..................	264,000	233		233	88
1894..................	272,000	175		175	64
1895..................	275,000	187		187	68
1896..................	282,500	183		183	64
1897..................	287,500	135		135	46
1898..................	298,772	89		89	30
1899..................	306,115	89		89	29
1900..................	321,616 census	147		147	46
1901..................	330,000 approximate	165		165	50
1902..................	340,000 "	170		170	50
1903..................	350,000 "	215		215	60
1904..................	360,000 "	166		166	46
1905..................	370,000 "	...		98	27

Serum laboratory opened in the fall of 1895.

Antitoxin distribution, free and unrestricted, began about September, 1895. Its use became general only during October and later, 1896.

London.

Year.	Population.	Deaths, Diphtheria and Croup.	Death Rate per 100,000.
1875	3,482,306	1,312	37.7
1876	3,538,246	987	27.9
1877	3,595,085	855	23.8
1878	3,652,837	1,150	31.5
1879	3,711,517	1,169	31.5
1880	3,771,139	1,108	29.4
1881	3,824,980	1,346	35.2
1882	3,862,956	1,707	44.2
1883	3,901,309	1,771	45.4
1884	3,940,042	1,698	43.1
1885	3,979,160	1,580	39.7
1886	4,018,666	1,374	34.2
1887	4,058,565	1,481	36.5
1888	4,098,860	1,800	43.9
1889	4,139,555	1,784	43.1
1890	4,180,654	1,885	45.1
1891	4,223,720	1,858	44.0
1892	4,269,634	2,241	52.5
1893	4,312,623	3,454	80.1
1894	4,351,501	2,873	66.0
1895	4,387,248	2,488	56.7
1896	4,419,411	2,804	63.0
1897	4,447,907	2,345	52.0
1898	4,472,664	1,823	40.8
1899	4,493,617	2,028	45.0
1900	4,510,711	1,620	36.0
1901	4,544,983	1,385	35.0
1902	4,579,110	1,199	26.0
1903	4,613,812	778	17.0
1904	4,648,950	754	16.0
1905	4,700,000	573	12.2

Liverpool.

Year.	Popluation.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	534,000	299	56
1879	541,000	201	37
1880	548,000	238	43
1881	552,508	193	35
1882	549,000	206	38
1883	546,000	223	41
1884	543,000	252	46
1885	540,000	346	64
1886	537,000	267	50
1887	534,000	209	39
1888	531,000	174	33
1889	527,000	186	35
1890	523,000	211	41
1891	517,980	119	23
1892	518,000	109	21
1893	518,000	85	17
1894	518,000	127	24
1895	638,291 *	170	27
1896	641,000	202	32
1897	663,633	149	22
1898	669,243	164	23
1899	674,912	242	36
1900	680,628	183	30
1901	686,332	209	30
1902	710,337 *	241	34
1903	716,810	177	24
1904	723,430	214	28
1905	723,000	214	29

* City boundaries extended.

Glasgow.

Year.	Population.		Deaths, Diphtheria and Croup.	Per 100,000.
1881..............................	511,415 census		...	...
1882..............................	517,000 approximate		...	...
1883..............................	522,000	"	...	...
1884..............................	528,000	"	...	...
1885..............................	533,000	"	...	...
1886..............................	538,000	"	211	39.1
1887..............................	543,000	"	291	53.6
1888..............................	548,000	"	274	50.0
1889..............................	553,000	"	298	54.0
1890..............................	558,000	"	203	36.3
1891..............................	565,710 census		194	34.4
1892..............................	669,059		249	37.2
1893..............................	677,883		310	45.8
1894..............................	686,820		306	45.1
1895..............................	695,876		185	26.6
1896..............................	705,052		137	19.4
1897..............................	714,919		145	20.3
1898..............................	724,349		132	18.2
1899..............................	733,903		123	16.8
1900..............................	743,963		149	20.0
1901..............................	764,467		123	16.1
1902..............................	775,601		127	16.4
1903..............................	787,897		118	15.0
1904..............................	798,357		104	13.0
1905..............................	810,000		48	6.0

Berlin.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	1,033,632	1,446	140
1879	1,065,440	1,355	127
1880	1,107,100	1,422	129
1881	1,138,700	1,778	156
1882	1,174,293	2,134	181
1883	1,207,114	2,932	243
1884	1,225,065	2,640	215
1885	1,299,207	2,007	154
1886	1,337,798	1,688	126
1887	1,376,389	1,404	112
1888	1,414,980	1,100	79
1889	1,453,571	1,284	88
1890	1,492,162	1,591	107
1891	1,609,415	1,075	66
1892	1,662,237	1,414	85
1893	1,714,938	1,643	95
1894	1,767,639	1,430	81
1895	1,669,138	1,000	59
1896	1,695,726	569	33
1897	1,708,499	547	32
1898	1,728,201	664	38
1899	1,747,903	655	37
1900	1,864,203	563	30
1901	1,913,528	513	26
1902	1,955,837	231	11
1903	1,998,146	245	12
1904	2,040,455	354	17
1905	2,026,000	310	15

Muenchen.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	222,000	298	130
1879	225,000	293	130
1880	229,854	367	160
1881	233,000	394	169
1882	238,000	263	110
1883	240,000	272	113
1884	242,000	182	75
1885	259,318	176	68
1886	265,710	223	86
1887	272,102	204	75
1888	728,494	264	36
1889	284,886	401	141
1890	291,278	303	104
1891	352,718	340	96
1892	372,418	308	83
1893	386,202	258	66
1894	399,986	284	73
1895	402,459	208	51
1896	412,000	185	44
1897	425,087	182	42
1898	436,430	181	41
1899	452,248	104	23
1900	499,932	110	22
1901	510,044	80	20
1902	527,379	68	12
1903	544,714	74	13
1904	562,049	89	15
1905	579,000	84	15

Königsberg.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	128,096	263	205
1879	132,028	197	150
1880	140,932	179	128
1881	141,560	262	178
1882	146,678	352	241
1883	150,350	287	191
1884	154,000	249	161
1885	150,297	286	190
1886	152,345	154	101
1887	154,393	179	120
1888	156,441	122	79
1889	158,489	211	133
1890	159,537	194	122
1891	162,739	92	50
1892	164,996	173	105
1893	167,099	179	107
1894	169,202	162	95
1895	171,497	86	50
1896	174,094	91	52
1897	176,595	74	42
1898	178,821	17	9
1899	181,047	16	9
1900	185,987	37	20
1901	191,429	32	16
1902	194,766	224	*115
1903	198,103	121	61
1904	201,440	86	42
1905	197,000	44	22

* Serious epidemic; antitoxin not extensively used owing to expense; no gratuitous distribution by city.

Hamburg.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	371,843	244	65
1879	277,068	256	68
1880	410,127	286	70
1881	416,295	282	67
1882	416,819	329	79
1883	435,964	336	77
1884	449,414	443	98
1885	462,278	509	110
1886	474,370	580	122
1887	486,462	567	117
1888	498,554	466	94
1889	510,646	475	93
1890	522,738	352	67
1891	571,689	216	38
1892	594,273	226	38
1893	612,933	362	59
1894	636,194	385	60
1895	618,945	132	21
1896	631,660	95	15
1897	642,131	113	17
1898	652,606	100	15
1899	663,073	109	16
1900	673,794	115	17
1901	715,093	116	16
1902	731,130	183	25
1903	747,167	160	21
1904	763,204	130	17
1905	790,000	84	10

Dresden.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	210,377	217	103
1879	215,400	159	74
1880	220,216	284	130
1881	223,100	381	170
1882	227,250	534	235
1883	233,600	495	212
1884	236,000	467	200
1885	243,980	342	140
1886	249,034	416	167
1887	254,088	330	130
1888	259,142	268	104
1889	264,198	268	101
1890	269,250	253	94
1891	297,585	256	91
1892	286,160	384	134
1893	304,519	370	121
1894	311,168	349	112
1895	330,172	170	51
1896	342,300	107	31
1897	368,485	115	31
1898	379,268	85	22
1899	388,587	88	23
1900	391,927	58	15
1901	404,773	57	14
1902	416,919	63	15
1903	518,405	76	16
1904	533,017	108	20
1905	530,000	74	14

Breslau.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	267,000	106	40
1879	270,000	105	39
1880	272,000	135	50
1881	275,000	158	57
1882	280,000	163	60
1883	287,000	323	113
1884	295,000	239	81
1885	297,413	218	73
1886	302,759	280	92
1887	308,105	497	125
1888	313,451	495	160
1889	318,797	382	120
1890	324,143	362	111
1891	339,318	323	95
1892	346,442	257	74
1893	353,551	409	116
1894	360,660	314	87
1895	370,038	242	65
1896	378,089	125	33
1897	385,198	98	25
1898	398,415	93	24
1899	405,362	94	23
1900	412,959	49	12
1901	427,833	71	17
1902	436,618	87	20
1903	445,403	96	21
1904	454,188	85	18
1905	465,000	92	20

Cologne.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	138,836	45	40
1879	140,104	55	39
1880	144,735	82	57
1881	146,000	78	53
1882	146,767	66	45
1883	148,640	55	37
1884	151,500	29	19
1885	160,015	70	44
1886	163,341	87	53
1887	166,667	79	48
1888	169,993	99	57
1889	261,105	89	38
1891	267,152	173	90
1892	286,230	255	120
1893	295,059	359	170
1894	303,508	517	135
1895	311,597	421	54
1896	319,000	173	44
1897	326,800	154	45
1898	332,773	150	50
1899	341,651	172	31
1900	349,628	110	12
1901	368,006	46	27
1902	378,541	101	30
1903	399,126	117	28
1904	409,322	113	28
1905	425,000	95	22

Frankfurt.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	122,292	79	65
1879	126,000	52	41
1880	136,831	33	24
1881	139,710	46	33
1882	140,000	53	38
1883	143,300	41	29
1884	144,600	73	50
1885	153,038	86	56
1886	156,577	123	80
1887	160,116	230	143
1888	163,655	162	99
1889	167,194	228	130
1890	170,733	285	168
1891	182,804	285	156
1892	188,050	278	149
1893	193,440	268	134
1894	198,238	208	105
1895	226,000	67	30
1896	233,000	46	20
1897	238,684	29	12
1898	244,808	23	9
1899	250,932	46	18
1900	264,645	33	12
1901	294,052	30	10
1902	302,731	44	14
1903	311,410	38	12
1904	320,089	49	15
1905	330,000	30	9

Vienna.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1880	721,016	597	83
1881	741,208	539	73
1882	749,919	522	70
1883	750,762	360	48
1884	759,849	342	45
1885	769,889	464	60
1886	780,066	546	70
1887	790,381	455	58
1888	800,836	521	65
1889	811,434	513	63
1890	822,176	536	65
1891	1,378,530	1,311	95
1892	1,406,933	1,580	112
1893	1,435,931	1,615	112
1894	1,465,637	1,679	114
1895	1,495,764	710	47
1896	1,526,623	621	40
1897	1,551,129	575	37
1898	1,590,295	520	32
1899	1,623,134	463	29
1900	1,656,662	306	18
1901	1,691,996	387	22
1902	1,726,604	438	25
1903	1,744,177	426	24
1904	1,797,992	386	21
1905	1,877,000	254	13

Paris.

Year.	Population.	Deaths, Diphtheria.	Per 100,000.
1880	2,225,000	2,048	92
1881	2,239,938 census	2,211	90
1882	2,244,000	2,244	100
1883	2,248,000	1,781	79
1884	2,251,000	1,928	85
1885	2,256,000	1,655	73
1886	2,260,945 census	1,512	67
1887	2,280,000	1,585	70
1888	2,300,000	1,729	75
1889	2,340,000	1,706	73
1890	2,380,000	1,668	70
1891	2,424,705	1,531	63
1892	2,444,000	1,403	59
1893	2,460,000	1,266	51
1894	2,480,000	1,009	40
1895	2,500,000	421	17
1896	2,511,629 census	444	18
1897	2,540,000	298	12
1898	2,570,000	259	10
1899	2,600,000	336	13
1900	2,630,000	294	11
1901	2,660,494 census	628	24
1902	2,690,000	529	20
1903	2,730,000	396	15
1904	2,780,000	250	9
1905	2,820,000	163	6

Combined Statistics.

Deaths and Death Rates from Diphtheria and Croup—New York, Brooklyn, Boston, Pittsburg, Baltimore, Philadelphia, Berlin, Cologne, Breslau, Dresden, Hamburg, Königsberg, Munich, Vienna, London, Glasgow, Liverpool, Paris, Frankfurt.

Year.	Population.	Deaths, Diphtheria and Croup.	Per 100,000.
1878	10,000,598	8,185	81.8
1879	10,188,268	7,205	70.7
1880	13,401,394	11,526	86.0
1881	13,642,366	13,897	101.9
1882	13,857,726	14,075	101.6
1883	14,049,727	13,721	97.6
1884	14,353,102	11,930	83.2
1885	14,544,489	12,399	85.2
1886	15,337,513	12,385	80.8
1887	15,617,867	12,721	79.5
1888	16,217,823	11,798	72.7
1889	16,300,948	12,247	75.1
1890	16,526,135	11,059	66.9
1891	17,689,146	12,389	70.0
1892	18,330,737	14,200	77.5
1893	18,467,970	15,726	80.4
1894	19,033,902	15,125	79.9
1895	19,143,188	10,657	55.6
1896	19,489,682	9,651	49.5
1897	19,800,629	8,942	45.2
1898	20,037,918	7,170	35.7
1899	20,358,857	7,256	35.6
1900	20,764,614	6,791	32.7
1901	20,874,572	6,104	29.2
1902	21,552,398	5,630	26.1
1903	21,865,299	5,117	23.4
1904	22,532,848	4,917	21.8
1905	22,790,000	4,323	18.9

The statistics for Vienna do not begin until 1880; those for Glasgow until 1886. The figures for Paris are those of diphtheria only.

We have plotted the above figures in the form of curves which we present herewith ;

Fig. 4.

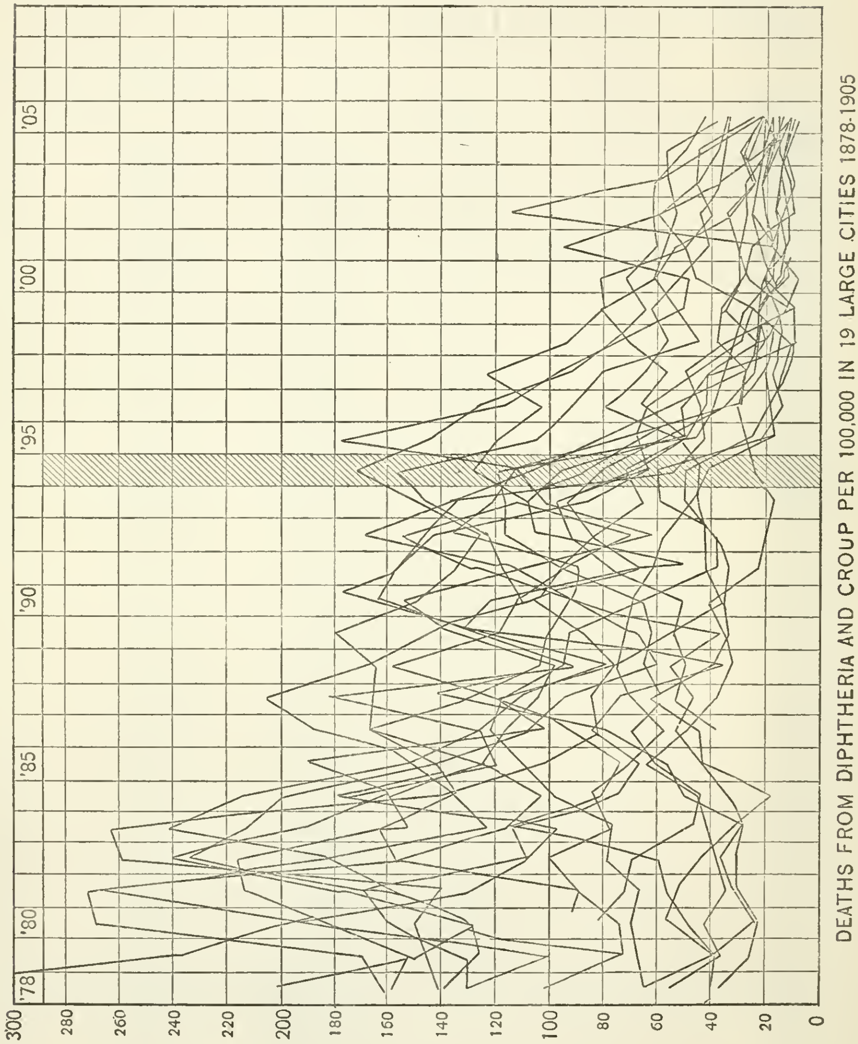
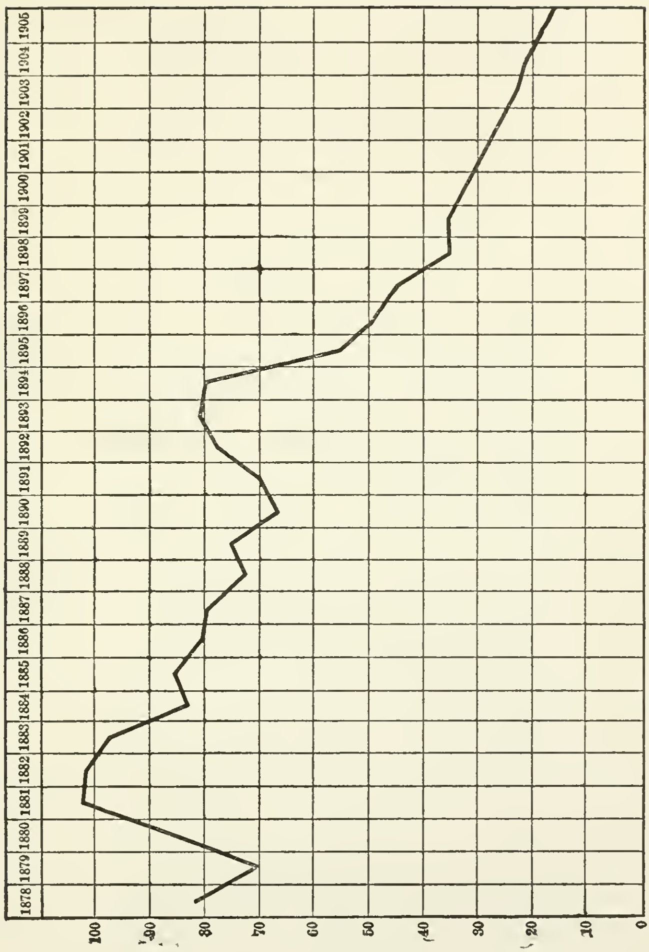


Fig. 5.



COMBINED CURVE FOR THE NINETEEN CITIES.

The two charts, one of nineteen cities combined and the other of the same cities treated singly, present in a very striking manner the great reduction in the number of deaths from diphtheria which occurred in 1895, the year of the beginning of the general use of antitoxin. A study of the prevalence of diphtheria during 1895 shows that there was no appreciable reduction in the cases in these cities merely of the deaths. Of the 19 cities only two show a slight increase while the others show a great reduction. The combined charts show in a most impressive manner how as the antitoxin treatment became more general the deaths became less and less until in 1904 they were but one-quarter of what they were in 1894. With later years, along with the lessened death rate, there have been less cases, as immunization has been more employed and the shortening of the period of disease in treated cases has prevented to some extent liability to infection. It is interesting to contrast diphtheria with phthisis in which along other lines such successful warfare has been waged. The reduction in the mortality in diphtheria has been more than double that in phthisis. (See figure 3.)

While the preceding tables serve as an accurate index of the value of serum treatment, they cannot be used for a comparison of the mortalities in different cities without being subjected to a correction for age distribution. Diphtheria being a disease especially of childhood, it is obvious that the relative proportion of children in a community will greatly affect the death rate from this disease. Since our purpose in presenting the tables has not been to make such comparisons we shall content ourselves merely with calling attention to this factor. The following table kindly compiled for us by Dr. Roger S. Tracy, formerly Registrar of the Department, will give some idea of the influence exerted by age distribution. In compiling this he has taken the total number of deaths from diphtheria and croup in New York in 1902 under 15 years of age as the basis of the calculation. This number was 1,965 out of a total of 2,015 deaths. The table shows that in these differently constituted populations the crude or general death rate would vary more than 50 per cent., while the actual mortality was the same.

City.	Date of census.	Population by census.	Population under 15 years, by census.	Per cent., under 15 years.	Estimated population, 1902.	Estimated under 15, 1902.	New York's diphtheria rate under 15.	Calculated diphtheria deaths under 15, according to New York rate for 1902.	Corresponding general death rate from diphtheria, 1902.	Actual diphtheria death rate to serve as comparison.
Berlin	1900	1,888,577	486,057	25.74	1,909,731	491,590	1.75	860	.45	.28
London	1901	4,536,541	1,357,874	29.93	4,579,110	1,370,600	1.75	2,398	.52	.30
Munich	1895	407,307	98,678	24.47	509,000	124,570	1.75	218	.43	.51
Paris	1901	2,657,335	501,512	18.87	2,695,065	508,750	1.75	890	.33	.24
Vienna	1900	1,674,957	455,790	27.22	1,701,989	471,200	1.75	823	.48	.20
New York	1900	3,437,202	1,053,298	30.64	3,665,735	1,123,400	1.75	1,965	.53	.53

EXTENT TO WHICH ANTITOXIN IS USED IN NEW YORK CITY.

In order to ascertain this for New York City at the present time, we have investigated all the cases of diphtheria occurring in New York during a period of about three weeks in November and December, 1905.

The total number of cases reported to the Department during this time was 385. In all but sixty of these reports stated that antitoxin had been administered.

In nine of these, however, antitoxin was subsequently administered, leaving 51 cases which did not receive antitoxin.

Of these 51 cases, six were thrown out by bacteriological examination as not being Klebs-Loeffler diphtheria, leaving only 45 cases of true diphtheria in which no antitoxin was given.

Of these cases, three died, as follows: 2 severe cases, no physician in attendance; 1 laryngeal case, died late in the disease the day after a physician was first summoned.

With the exception of the fatal cases just mentioned, and one case reported as being "moderately severe," all of these "no-antitoxin" cases were mild, and this fact in almost all the instances determined the decision of the physician in not administering antitoxin.

This would show, therefore, that about 1/8 of the cases reported as being probably diphtheria, do not receive antitoxin, and that this remedy is used in almost all the severe cases attended by physicians.

VIABILITY OF KLEBS-LOEFFLER ORGANISMS FROM DRIED PSEUDO-MEMBRANE OF A RAPIDLY FATAL CASE.

By Anna I. Von Sholly, M. D.,

Assistant Bacteriologist, Research Laboratory.

On August 21, 1905, pseudo-membrane was obtained from a rapidly fatal case of diphtheria in which at the autopsy the pseudo-membrane was found to extend down from the trachea into the smallest visible bronchi. Several bits of this membrane about 1 c. c. in diameter, and at the same time the finely powdered membrane, were dried on glass in diffuse daylight.

At successive intervals emulsions of each were made in 1 c. c. of sterile water. These emulsions were about the opacity of a 24-hour typhoid culture in broth. From these, blood agar plates and Loeffler serum tubes (as controls) were inoculated. Unfortunately, too long a time was allowed to pass after the third inoculation, so that the period of the exact death of the organisms lies in rather wide limits between the middle of the third week and the fifth week. This time was allowed to elapse because we feared that the material would be used up too soon. The somewhat greater rapidity of the death of the bacilli in the finely divided membrane, as one would expect, is clearly shown. The Loeffler serum tubes also showed this very prettily. Whereas on the fourth and eighth days the dried intact membranes give a diffuse confluent growth, the powdered membranes gave discreet colonies. Only on the 17th day did the colonies from the intact membrane become discreet.

The results were as follows:

August 21, 1905.	August 25, 1905, dried 4 days.	August 29, 1905, dried 8 days.	September 7, 1905, dried 17 days.	September 26, 1905, dried 36 days.
Dried intact membrane..........	60,000,000 colonies to 1 c.c.	24,000,000 colonies to 1 c.c.	15,000,000 colonies to 1 c.c....... ...	No growth.
Dried powdered membrane......	39,000,000 colonies to 1 c.c.	9,000,000 colonies to 1 c.c.	3,000,000 colonies to 1 c. c....	No growth.

On September 29, 1905, (39 days dried) an emulsion twice as thick was tested with no resulting growth, and serum broth tested the following day with large amounts of membrane was also negative.

VIRULENCE OF DIPHTHERIA-LIKE BACILLI ISOLATED FROM NORMAL THROATS OF CHILDREN.

By Anna I. Von Sholly, M. D.,

Assistant Bacteriologist, Research Laboratory.

The following is a preliminary report on the relative virulence of diphtheria-like organisms isolated from normal throats during the six months August 30, 1905, to February 13, 1906. By diphtheria-like bacilli we mean all organisms which show the typical morphological appearance characteristic of the Klebs-Loeffler bacillus. The so-called "Pseudo-Diphtheria" or Hoffman's bacillus is excluded.

In 1894, Park and Beebe examined culturally 330 throats of normal individuals and found diphtheria-like organisms in 32 cases or 9.7 per cent. of those examined. Of these 8 or 2.4 per cent. were virulent to guinea pigs and 24 or 7.3 per cent. non-virulent. Since then, what with the more careful isolation of the cases and the more general use of antitoxin, etc., the virulence of intensity of diphtheria in this section of the country as shown by the mortality-curve, has steadily declined. As this year, 1905-06, has been an especially mild diphtheria year it was thought that a comparison of present conditions with those obtained in 1894 might be profitable.

The cases examined up to the middle of January were obtained from Dr. Southworth's clinic at the dispensary of the Babies' Hospital, Fifty-fifth street and Lexington avenue, while the large majority of those examined since then have come from the children's clinic at the New York Infirmary for Women and Children, Fifteenth street and Lexington place, through the courtesy of Dr. Daniel. I mention this as one of the factors usually considered as bearing on the results, inasmuch as the patients of the latter clinic are a much poorer class, chiefly foreign—Russian and Italian—and consequently are much more poorly nourished and live under much less hygenic conditions. All throats which appeared normal to the eye were swabbed, irrespective of the disease from which the child was suffering, with the exception only of those cases where there was a nasal discharge suggestive of mild nasal diphtheria or a laryngeal disturbance. The larger number of the younger cases under

a year were purely feeding cases, while the older ones suffered variously from rachitis, digestive disturbances, anemia, diarrhoeas, enlarged tonsils and adenoids, etc., and a few of pertussis and mumps.

The following table gives the number of cases examined according to season together with the total for the six months and the results obtained.

TABLE I.

1905-6.	Number of Cases examined.	Diphtheria-like bacilli isolated from	Virulent K. L. bacilli isolated from	Non-virulent K.L.-like bacilli isolated from.	Pseudo-diphtheria bacilli in	Xeroses-like bacilli in
August 30-31	21	..	..	..	..	..
September	30	1 (3%)	..	1	1 (3%)	..
October	31	..	..	..	..	..
November	10	..	..	..	6 (6%)	..
December	27	4 (15%)	..	4	4 (15%)	..
January	69	5 (7.2%)	2 (3%)	3	35 (50%)	2
February 1-13	42	2 (4.7%)	1	1	15 (35%)	..
Total	230	12 (5.2%)	3 (1.3%)	9 (3.9%)	61 (26.5%)	2
Park and Beebe, 1894	330	32 (9.7%)	8 (2.4%)	24 (7.3%)	..	..

In all cases where the pseudo-diphtheria bacillus was found, where there was any doubt as to its identity, cultural tests and animal inoculations were used to establish it. Otherwise it was simply plated out and isolated.

The virulence test was made by inoculation of 200 to 300 gm. guinea pigs with 48-hour cultures in ascitic broth of the strain isolated. At the outset, 1 c.c. and ½ c.c. injections were made subcutaneously and controlled by antitoxin. If the pigs died within the 4 days, still smaller doses up to 1-10 c.c. were given, each being always controlled by antitoxin. When the animal did not succumb to the initial doses, 10 c.c. doses were given.

Of the three virulent strains 1-10 c.c. killed in 24 hours in one case, and in two cases ½ c.c. in 48 hours, the control pigs living.

Of the 8 non-virulent cases, 10 c.c. doses had no effect at all on the seven pigs. One case just recently isolated is still under test. Two organisms isolated, which were morphologically like Klebs-Loeffler bacillus of the barred type, behaved somewhat differently culturally from the ordinary diphtheria bacillus and were non-virulent. In 10 c.c. doses in one case both the non-antitoxin as well as the control antitoxin pig died and in the other the control pig alone died. These organisms were identified as belonging to the so-called xerosis group.

The ages of the children examined come under wide limits, varying from 1 month to 15 years, almost one half, however, falling under 3 years. Table II. gives the ages with the number examined and the number from which Klebs-Loeffler like organisms were isolated and their virulence:

TABLE II.

Age.	Number of Cases.	Diphtheria-like bacilli in.	Virulent K. L.	Pseudo-diphtheria.
4 weeks to 1 year	51	1	..	13
1 to 2 years	30	1	1	4
2 to 3 years	20	1	..	7
3 to 4 years	26	2	..	10
4 to 5 years	13	..	..	4
5 to 6 years	19	2	1	6
6 to 7 years	10	..	..	1
7 to 8 years	10	..	..	2
8 to 9 years	9	1	1	3
9 to 10 years	6	1	..	3
10 to 15 years	23	2	..	7
Exact age not known	13	1	..	..
Total	230	12	3	61

A STUDY OF PNEUMOCOCCI: A COMPARISON BETWEEN THE PNEUMOCOCCI FOUND IN THE THROAT SECRETIONS OF HEALTHY PERSONS LIVING IN BOTH CITY AND COUNTRY AND THOSE OBTAINED FROM PNEUMONIC EXUDATES AND DISEASED MUCOUS MEMBRANES.

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The investigations carried on in the Research Laboratory were planned after consultation with the members of the Commission for the Investigation of Acute Respiratory Diseases, of the Health Department of The City of New York, but were otherwise entirely independent of that body. The study of the agglutination characteristics was undertaken by Dr. K. R. Collins, whose report follows this. The investigations are still being carried on and these preliminary reports are made at the suggestion of the Commission, so that all the workers in carrying on further studies might receive help from work already done.

Plan of Investigations.

In this study the following points have been considered:

I.—The presence of pneumococci (1) in normal sputum, (2) in pneumonic sputum and autopsy material, (3) in the sputum or exudates from pathogenic cases other than pneumonias.

II.—The comparison of the strains obtained from the different sources in the following particulars: (1) morphological and cultural characteristics, (2) virulence, (3) serum reactions.

The scheme of the work, which was carried out more or less fully, is tabulated as follows:

TABLE I.

Original material from autopsy, sputum or other source. Three smears made: 1. Stained with Loeffler's methylene blue .... 2. Stained with Grams solutions........ 3. Stained with Hiss' capsule stain........	Remove a certain portion aseptically and plant into serum broth (A). From tube A make several dilutions, tubes B, C, D, etc.	After 24 hrs. at 36° C. make smears from each tube, select culture most characteristic of pneumococcus, and inject subcutaneously into...	Rabbit (800–1000 gms.) 3 or 4 c. c. or White mouse (young adult) ½ c.c.	When animal dies, expose heart and inoculate heart's blood into serum-broth, over surface of agar plate and into Hiss' inulin medium. Also make three smears stained as in beginning......	After 24 hrs. if the serum-broth shows pure culture of pneumococcus or streptococcus-like organisms, inoculate into two rabbits if from rabbit or into two mice if from mouse, to test for virulence. If culture is not pure, fish from the pneumococcus-like colonies on agar plate. When pure culture is thus obtained, inoculate as above......... (Keep this culture for stock strain.)	Rabbit (800–1000 gms.) 4 c.c. into ear vein and Rabbit (800–1000 gms.) $\frac{1}{10}$ c.c. into ear vein or White mouse (young adult) $\frac{1}{100}$ c.c. subcutaneously and White mouse (young adult) $\frac{1}{10000}$ c.c. subcutaneously.	At autopsy make from heart's blood a culture into serum-broth, over a surface agar plate and into Hiss' inulin medium. Make three smears, stained as in the beginning.	
	STOCK STRAINS.........	Plant these into various culture media and study their characteristics. Replant the stock cultures on slant blood-agar every four to seven days, keeping track of the number of culture generations. Study minutely from time to time in the various media, in animals and in serum reactions. Note any changes.						
	Make four blood-agar plates, one direct from original material, and one each from dilution tubes A, B, and C..............	After 24 hrs. at 36° C. describe gross appearance of plates and colonies. Study under 2 and 7 magnification and note proportion of pneumococcus-like colonies to others. Fish from 10 to 15 pneumococcus-like colonies and plant on slant blood-agar. (If the original material was absolutely fresh, the colonies in the majority, whether pneumococcus-like or not, should also be fished.) If streptococcus-like colonies are present on plate, fish a few and carry on with the others.........	After 24 hrs. transfer from slant blood-agar to serum-broth.......	Make smear and note morphology in serum-broth from each of these fishings. Inoculate 0.5 c.c. of each into a tube of Hiss' inulin medium. Observe proportion of cultures which coagulate the inulin medium and time required. Save distinct varieties of pneumococci and certain strains of streptococci for permanent strains...................... (Keep this culture for stock strain.)	Test the virulence of this culture or cultures, both in rabbits and white mice, following the scheme given above........	At autopsy make cultures and smears as indicated above.		

TABLE II.

GENEALOGICAL RECORD.

No. of Case. — Name and short history of case.

- 1002 = Animal series. (Description of original material.)
  - 1st rabbit, inoc. with 3 c.c.
    - 3122 = Inulin-serum medium from 1st rabbit (description).
    - 2122 = Streak blood-agar plate from 1st rabbit (description).
    - 1122 = serum-broth culture from 1st rabbit (description).
      - 3d rabbit, 0.1 c.c. inoc.
        - 3332 Inulin-serum medium from 3d rabbit (description).
        - 2322 Streak blood-agar plate from 3d rabbit (description).
        - 1322 Serum-broth medium from 3d rabbit (description).
      - 2d rabbit, 4 c.c. inoc.
        - 3222 Inulin-serum medium from 2d rabbit (description).
        - 2222 Streak blood agar plate from 2d rabbit (description).
        - 1222 Serum-broth medium from 2d rabbit (description).
  - 1st mouse, inoc. with 0.5 c.c.
    - 3112
    - 2112
    - 1112
      - 4th mouse, 0.00001 c.c. inoc.
        - 3412
        - 2412
        - 1412
      - 3d mouse, 0.01 c.c. inoc.
        - 3312
        - 2312
        - 1312
      - 2d mouse, 0.5 c.c. inoc.
        - 3212
        - 2212
        - 1212

Meaning of the numbers is the same as the above, except 1 instead of 2 in units place indicates that mouse has been used instead of rabbit, and consequently the numbers in hundreds place, indicating the doses, have a different meaning.

Keeping of Records—Geneological tables of each strain have been kept, a modification of the Dewey Library System of numbers being used to indicate the cultures. Thus by referring to these tables one is able quickly to get the principal points in the history of a particular culture from the time of its isolation.

Numbers of four denominations have been used, the units place indicating the series, the tens place the animal used for inoculations, the hundreds place the dose received, and the thousands place the medium employed. Underneath this number the number of culture generations is placed in parentheses. Table II. is one such genealogical table.

In addition to these tables, comment sheets on each strain and tables of comparative morphology and cultural peculiarities have been kept.

The Presence of Pneumococci.

Two hundred cases have been examined for the presence of the pneumococcus. In the great majority of cases two methods—(*a*) animal inoculation of mass cultures and (*b*) stroke blood-agar plates, as shown in Table I.—have been employed in attempts at isolation; in the other cases only one of these two methods has been used. Table III. shows the grouping of the cases and the number in which typical and atypical pneumococci have been found.

From this table we see that typical pneumococci have been obtained in a large percentage of normal cases in both city and country. A few pneumococci may have been missed because of occasional contaminations or overgrown cultures or the employment of large rabbits or some other cause. In the majority of cases where no pneumococci were found streptococci were isolated. From a series of autopsies on cases of broncho-pneumonia at the Willard Parker Hospital, and from a series of pertussis sputa from the Foundling Hospital, large numbers of influenza-like organisms were found with smaller numbers of streptococci and occasionally with a few pneumococci. It was very difficult to get rid of these influenza-like organisms, as great numbers passed through the animal inoculated with mass-cultures, and in the plates and serum-broth tubes they grew abundantly in close association with the

pneumococcus. Repeated platings generally had to be made before a pure culture of the pneumococcus could be obtained in these cases.

Table III.

Showing Number of Cases Studied and Number in Which Pneumococci Were Found.

Groups.	Subdivisions.	Number of Cases.	Pneumococci not Isolated.	Pneumococci Isolated.	
				Atypical.	Typical.
	Research Laboratory	3	3	..	..
	Bellevue Students	10	2	1	7
	Saranac Lake	28	15	3	11
	Sea Breeze	5	3	..	2
	Tarrytown	1	..	..	1
	Foundling Hospital	9	2	..	7
	Briarcliff	6	3	..	3
	Hyde Park	4	..	4	..
	Millbrook	7	..	2	5
	Newburgh	5	..	1	4
	Babies' Hospital	2	2	..	..
Pneumonia.	Lobar-	53	4	5	45
	Broncho-	21	5	2	14
Colds.		15	5	..	10
Miscellaneous.	Measles	3	1	..	2
	Scarlet-fever	5	3	..	2
	Tuberculosis	5	3	..	2
	Pertussis	5	4	..	1
	Influenza	2	2	..	..
	Pleurisy	1	..	..	1
	Typhoid	1	1	..	..
	Mastoiditis	1	..	..	1
	Synovitis	3	1	..	2
	Meningitis	1	..	..	1
	Œdema of Lungs	1	1	..	..
	Empyæma	3	1	..	2

Comparison of Strains.

Morphological and Cultural Characteristics—We have divided the pure cultures of pneumococci obtained into two broad groups according to their morphological and cultural characteristics. The first group is composed of typical pneumococci and the second of atypical ones.

By typical pneumococci we mean cocci which (1) under certain more or less constant cultural conditions occur principally in slightly elongated and pointed twos with broader ends apposed, (2) under similar or other cultural conditions form capsules, (3) when grown in inulin-serum[1] medium produce coagulation, and (4) when grown in poured blood-agar plates produce a distinct green color in and about colonies.

By atypical pneumococci we mean (1) cocci which morphologically and culturally resemble more or less closely the pneumococcus except in their growth in the Hiss inulin medium, which they do not coagulate; (2) cocci which are like streptococci morphologically, but which produce coagulation of the Hiss inulin medium.

Referring to Table III. we see that a larger number of atypical strains have been obtained from normal cases, in all of which only sputum was studied, than from pathogenic. This may be due simply to the fact that so many more typical pneumococci were present in the majority of pathogenic cases studied that the atypical ones may have been missed in some of these cases. Atypical pneumococci of the first group, *i. e.*, those which do not coagulate inulin-serum medium, have been found as the majority of colonies and as the only pneumococcus-like

[1] The inulin used in the course of the present work in making up Hiss' medium (*Jour. of Exper. Med.*, 1905, vii., 317) was prepared in this laboratory by R. B. Gibson, for at the time we were unable to obtain it from commercial sources. The method employed in the obtaining of this substance follows: Dandelion (taraxacum) roots were soaked in cold tap water until soft, and if coarsely ground the roots were then run through an ordinary hash machine. The material was transferred to a gauze bag, and was washed thoroughly in running cold tap water to remove a portion of the soluble impurities and the finer solid particles which would interfere with subsequent filtration. The washed roots were extracted in boiling water, strained, and filtered. A second immediate extraction followed. The filtrates were united and evaporated over a Bunsen burner to a thin syrup. Alcohol (10-15%) was added and the mixture was cooled to 0° or below. The inulin separating out on standing was thoroughly washed by decantation with cold alcohol (10-20%) and then with 95% alcohol. It was filtered into a suction funnel washed on the filter with hot alcohol sucked dry, and finally spread on filter paper in a warm place to remove the alcohol still remaining. The resulting product can be obtained as a fine white powder which gives the ordinary reactions of inulin; solutions of this production do not reduce Fehling's solution. The yield from five pounds of the tubers was about three hundred grams.

organism in the sputum from two cases of pneumonia, and have been accompanied by typical pneumococci in the sputum from three other cases. So far they have not been found in autopsies following pneumonia. In one autopsy case and in one broncho-pneumonic sputum large numbers of cocci of the second group of atypical pneumococci were found.

It is interesting to note that, when some of the non-coagulating cultures were studied more minutely, various colonies being fished and the resulting cultures being tested for their ability to coagulate serum-inulin media, in the case of one culture one colony out of six produced late coagulation. From this coagulating colony, however, no further colonies were obtained producing coagulation. Among the typical pneumococci all strains vary somewhat with regard to their power to coagulate the Hiss medium, a few producing very late coagulation. When individual colonies were fished from some of these latter strains, it was found that there was a wide variation in the time required for coagulation, an occasional one not coagulating at all. It seems, from these observations, that the non-coagulating, more or less morphologically typical pneumococci are closely related to the typical late coagulators. One of these atypical strains showed typical capsules in the heart's blood of animals and the other showed occasional small capsules.

All of the typical and atypical strains, as well as many strains of streptococci, have produced a green color in and about colonies in poured blood-agar plates, while other streptococci have produced large areas of hæmolysis about colonies and no green color. These results agree in part with those of Schottmüller (*Munchener med. Woch.*, 1903, p. 849), and E. Fränkel (*Munchener med. Woch.*, 1905, p. 548), who divide streptococci into three groups according to their behavior in blood-agar plates: Streptococcus pyogenes producing much hæmolysis, streptococcus virideus producing green color, and streptococcus mucosus producing mucous-like material as well as green color. These results differ from those of Rosenow (*Journal of Infectious Diseases*, 1904, I, 280) who states that no streptococcus tried by him produced green color, while all pneumococci did, and he therefore recommends this test in differentiating the two species. From the sputa of a number of

cases of broncho-pneumonia we tried to isolate the pneumococcus by this method, making poured blood-agar plates from different dilutions of the sputum and fishing from the green colonies, and at the same time we used the method of animal inoculation by mass-cultures. In every case by the first method only streptococcus-like organisms were obtained, while by the second typical pneumococci were isolated.

All of the strains of typical pneumococci studied by us may be divided into several distinct morphologic varieties. We call them varieties, because while each strain shows a wide limit of fluctuating variability, certain strains have similar predominating constant characteristics. These varieties are:

1. Small cocci occurring under most cultural conditions in twos and producing small capsules.

2. Large cocci occurring readily in short and medium-length chains and producing large capsules.

3. The so-called streptococcus mucosus.

The first two varieties are less distinctly bounded than the last which forms a definite morphologic variety. This variety, which has been mentioned only a few times in literature (Schottmüller, *Munchener med. Woch.*, 1903; L. Buerger, *Medical News,* 1904, p. 1117; E. Fränkel, *Munchener med. Woch.*, No. 12, 1905; L. Heim, *Zeit. fur Hyg.*, 1905, I., 139), has been classed as a streptococcus, under the name of streptococcus mucosus by Schottmüller, and streptococcus mucosus capsulatus by others. It has been isolated by us from eight cases of pneumonia, from two cases of cold, and from two normal individuals, and has been seen in mixed cultures in a number of other cases. Three of the cases of pneumonia were early autopsy cases. In two of these the organism occurred pure and in large numbers (two hundred colonies were fished in one case and the resulting cultures were all similar); in the third case it was accompanied by a smaller number of the first variety of typical pneumococci. In one pneumonic sputum and in one normal individual the first variety of typical pneumococci also accompanied it, while in all the other cases it was the only pneumococcus-like organism isolated. It has thus been found by us more frequently in cases of pneu-

monia than in other cases. We have classed it among the typical pneumococci for the following reasons:

1. On serum-free culture media after the first two or three culture generations it produces no mucous-like material and shows no capsule or chain formation, but appears like a typical pneumococcus.

2. It readily coagulates the Hiss inulin medium.

3. It shows very distinct capsules in serum media and in the blood of inoculated animals.

4. It has been found pure and in large numbers in two cases of typical lobar pneumonia.

5. The results obtained from absorption experiments (see the Collins report) indicate a close relationship between it and certain typical pneumococci of the second variety, while no relationship is shown between it and the strains of typical streptococci tested.

It has been classed with the streptococci heretofore because of its ability readily to produce rounded forms and short chains. According to our descriptions of typical and atypical pneumococci it might be classed by many with the latter, but considering its ability under certain conditions to show typical pneumococcus forms we prefer to class it with the former, and make it a distince variety. With regard to nomenclature, it should be called, according to the classification followed, streptococcus lanceolatus, var. mucosus (the classification of Lehmann and Neumann, which we prefer), or Diplococcus lanceolatus, var. mucosus (the classification of other authors) ; we have given it the trivial name, pneumococcus mucosus.

By referring to the section on serum reactions below and to Dr. Collins's report on the agglutination of the pneumococcus, it will be found that all the strains of this variety isolated by us show a specific similarity in these reactions.

A certain number of cultures from both normal and abnormal cases, which showed the characteristics of typical pneumococci immediately after isolation, have later dropped some of these characteristics and become more like streptococci. They appear principally in chains and no longer coagulate the inulin-serum medium. Whether some of these cultures were mixed in the beginning with a streptococcus-like organism

growing in intimate connection with the pneumococcus, as the influenza bacillus does, and finally outgrowing it, or whether they are all mutating varieties, is still a question. With such a mass of cultures it was impossible to follow each closely, to make plates, and to study colonies of each new culture generation, but, judging from the few apparently changing strains which have been more minutely studied, it would seem as if some of these cultures were really changing by mutation. None of them have become permanently typical streptococci—that is, they show more or less irregularity in chain production, sometimes produce elongated and pointed twos and always green color in blood-agar plates, but they seem gradually to lose their power to coagulate inulin-serum medium. These observations in regard to mutating varieties indicate a close relationship between certain pneumococci and streptococci, a relationship which previous investigators have noted.

All strains of pneumococci tried coagulated, usually within forty-eight hours, serum media containing dextrose, lactose, or saccharose, as do also certain strains of streptococci. With mannit different strains of pneumococci act differently. Out of one hundred strains tested, twenty-nine did not coagulate mannit-serum medium after fourteen days. Among the seventy-one coagulators, sixteen coagulated in twenty-four hours, seventeen in forty-eight hours, one on the third day, five on the fifth day, and the rest between the fifth and fourteenth days. With the exception of the mucosus variety, there seems to be no relation between this coagulation and the varieties or groups of pneumococci. All of the pneumococcus mucosus strains tested coagulated the mannit medium within two days. Certain atypical strains which did not coagulate the inulin readily coagulated the mannit medium, while the few definite streptococci tried did not coagulate either. The plate growths from these non-coagulating cultures all showed practically as many colonies as those from the coagulating ones.

Virulence—The virulence of the different strains of pneumococci for lower animals depends in great measure upon the method of isolation used. If the plate method be employed, fishing individual colonies, the majority of pure cultures obtained will be distinctly less virulent than those isolated by the mass-culture method. The mass-culture method conists in inoculating a mass of sputum or material to be tested into

serum-broth (previously tested for ability to give abundant growth of pneumococci), placing at 36 degrees C. for twenty-four hours, and inoculating a certain amount of the resulting culture subcutaneously into the animal chosen. The culture isolated from the heart's blood of the animal at autopsy is then tested for virulence in the same species of animal.

We have used both rabbits and white mice for the inoculations, but in the great majority of cases the former animals only. Young rabbits, weighing from 800 to 1000 grams, and young adult mice have been chosen.

By testing the virulence of strains isolated by the mass-culture method, it has been shown that the percentage of virulent strains of pneumococci isolated from cases of pneumonia is higher than the percentage of those isolated from normal cases (see Table IV.).

Table IV.

Percentage of Virulent Strains.

Amount Inoculated.	Pneumonia Cases.	Healthy Individuals.
4.0 Cubic centimeters	87 Per Cent.	69 Per Cent.
0.1 Cubic centimeter	51 Per Cent.	31 Per Cent.

Most of the strains isolated from the cases of broncho-pneumonia which are included with the cases of pneumonia are not very virulent, while most of the strains from the colds which have not been noted here are virulent. Among the normal individuals the largest percentage of virulent pneumococci came from the Foundling Hospital children, the next from the Bellevue students, the next from the country around New York, and the smallest from Saranac Lake. Too much weight should not be attached to this summary, because of the comparatively small number of cases examined.

Normal No. 40 in contact with pneumonia No. 36 were of equally extreme virulence for both mice and rabbits. All of the pneumococcus mucosus strains tested have been with one exception extremely virulent for mice and decidedly less so for rabbits.

Retention of Virulence—Grown on artificial media, all of the virulent strains are losing their virulence although those transplanted on media containing blood from the species of animal used for the testing remained more virulent longer, for that species than for the other species of test animal chosen. No. 36, however, one of the most virulent strains tested, remained virulent for a long time for both rabbits and mice when grown on rabbit blood-agar. It seems now gradually to be losing its virulence for both animals. When grown in Bolduan's calcium-broth medium (see page 613), cultures of pneumococcus remain alive and retain their virulence as long as when grown in serum-broth according to the few tests made; therefore, as this medium generally allows an abundant growth, it is an excellent one to use when for any reason the use of serum is undesirable.

Agglutination reactions are described in a separate report by Dr. Collins.

Serum Reactions.

Specific Protective Substances—According to Neufeld and Rimpau (*Deutsch med. Woch.*, 1904, p. 1458), the serum of rabbits inoculated with pneumococcus cultures becomes speedily protective for white mice. They claim to have obtained after the second inoculation of large doses of pneumococcus bodies, the first killed by heat and the second living, a serum which was highly protective for mice. They claim that this serum has no lytic properties for the pneumococcus, but that the specific protective substance is a bacteriotropic substance uniting with the bacteria and preparing them for ingestion by the leucocytes, and that when this serum is added to a mixture of bacteria and normal leucocytes in vitro more phagocytosis is produced than when normal serum is used. So far Neufeld's bacteriotropic substance agrees with Wright's (*Proceedings of the Royal Soc. of London,* 1903, LXXII., 337) opsonic substance, except that Neufeld claims that his substance is not destroyed by low heat, while Wright says that his is. Therefore Neufeld states that his bacteriotropic substance is not the same as Wright's opsonic substance.

Very little as yet has been done by us in attempting to raise in animals specific protective substances for the pneumococcus or in studying the properties of such substances. In the beginning we followed Neufeld's method, inoculating large doses of surface cultures of pneumococci into

rabbits. The first cultures were subjected to from 60 degrees to 65 degrees C. for from fifteen to thirty minutes and the subsequent cultures were living. There is no doubt that a preliminary large dose of a dead culture could be followed by a larger dose of a living culture without causing death than if a small preliminary dose had been used, but the serum of such rabbits showed no protective action in mice with any of the strains of pneumococcus tested. Only a few tests were made, however, so no definite conclusion can be drawn. The phagocytic power in vitro seemed to be slightly increased for some of the strains, each by its own serum.

It was found that the opsonic power of normal rabbit, sheep, and especially of normal horse serum is very great for some strains of pneumococci, less so for others, and very slight for others. All of the strains of pneumococcus mucosus tested belong to this last group. Since rabbits proved unsatisfactory, it was decided to experiment with sheep. Two sheep were chosen, one of which was inoculated with one of the first variety of pneumococcus and the other with a strain of pneumoccoccus mucosus. The sheep have received eleven inoculations and have been bled twelve times, as is shown by the following table:

TABLE V.

Inoculations and Bleedings of Sheep.

Amount Inoculated.	Date of Inoculation.	Date of Bleeding.
20 c.c. of 24-hr. broth cult. centrifugalized and exposed to 60° C. for 20 min.	March 3	....
27 c.c. of 24-hr. broth cult. centrifugalized and exposed to 60° C. for 20 min.	" 10	March 15
28 c.c. of 24-hr. broth cult. centrifugalized and exposed to 60° C. for 10 min.	" 17	" 24
32 c.c. of 24-hr. calcium-broth cult. centrifugalized.	" 29	April 2
40 c.c. of 24-hr. calcium-broth cult., 30 c.c. centrifugalized and 10 c.o. non-centrifugalized.	April 8	....
50 c.c. of 24-hr. calcium-broth cult., 30 c.c. centrifugalized and 20 c.c. non-centrifugalized.	" 19	April 27
60 c.c. of 24-hr. calcium-broth cult., 30 c.c. centrifugalized and 30 c.c. non-centrifugalized.	" 28	May 4
70 c.c. of 24-hr. calcium-broth cult., 30 c.c. centrifugalized and 40 c.c. non-centrifugalized.	May 5	" 10
80 c.c. of 24 hr. glucose-calcium-broth cult., 30 c.c. centrifugalized and 50 c.c. non-centrifugalized.	" 15	" 24
85 c.c. of 24-hr. glucose-calcium-broth cult., 30 c.c., centrifugalized and 55 c.c. non-centrifugalized.	" 27	June 5
50 c.c. of 24-hr. glucose-calcium-broth cult., +10 slant blood-agar cult.	June 8	" 15
	....	" 21

The serum from each bleeding was tested in vitro for its opsonic or bacteriotropic power on a number of strains of pneumococci, and from a few of the bleedings it was tested in addition for its protective power in white mice. In testing the opsonic power of the serum in vitro the following technic was used: To 0.5 c.c. of serum, undiluted or diluted, in a short wide test tube, were added 0.5 c.c. of a thick suspension of washed normal leucocytes and 0.5 c.c. of the dilution of bacteria. The washings and dilutions were made with 0.8 per cent. of sodium chloride solution. The mixtures were kept at 36 degrees C. and smears made at stated times. The leucocytes almost immediately form a thin layer about the sides and bottom of the test tube and a well spread smear containing large numbers of leucocytes is made by scraping from this layer with a flatly coiled platinum loop and spreading quickly on a clean glass slide. The smears were fixed in methyl alcohol and stained with eosin and methylene blue. Normal leucocytes from rabbits, guinea-pigs, sheep, and horses have been used, and so far our results have agreed with those of all other observers in regard to the indifferent action of leucocytes from different species of animals. According to our experiments, some species of leucocytes need more careful washing than others, probably because of the greater opsonic power of the corresponding normal serum. For example, horse leucocytes must be most carefully washed in order to keep the controls from showing phagocytosis. We have used horse leucocytes for many of the experiments because of our ability to obtain them easily and quickly in large quantities. The horse is bled just before the leucocytes are to be used and the blood is collected aseptically in flasks, with one tenth its volume of a 10 per cent. solution of sodium citrate in normal salt solution. After mixing, the blood is allowed to stand, and within ten minutes the red blood cells have settled, leaving the plasma, containing many leucocytes, above. This is drawn off, centrifugalized, and the leucocytes are washed carefully four times; each time fresh sterile plugs are used for the tubes. In this way it is easy to obtain a large amount of a very thick suspension of actively motile polynuclear leucocytes. Of such a suspension 0.5 c.c. added to the mixture of 0.5 c.c. each of 0.8 per cent. salt solution and the required dilution of bacteria has been used as one control, and a similar

mixture with normal serum in the place of the 0.8 per cent. salt solution as another.

The dilutions of the bacteria were prepared as follows: A twenty-four-hour calcium-broth culture made from a twenty-four-hour blood agar-slant culture of the stock culture (the blood-agar was made from rabbit blood and kept in the thermostat at 36 degrees C. for two days before using) was centrifugalized and enough 0.8 per cent. salt solution added to the bacteria to make a suspension of about 2,000,000,000 bacteria to the cubic centimeter.

In estimating the phagocytic action by this method, it has been found that a large number of polynuclear leucocytes must be counted, as phagocytosis seems to occur irregularly, a group of polynuclear leucocytes each one loaded with bacteria filling one field, and a group containing no organisms the next.

The mixtures were examined in the beginning, at the end of one quarter, one half, two, three, five, and twenty-four hours. It was found that the difference between the serum controls or heated serum and the specific serum was more marked after fifteen to thirty minutes than at the height of phagocytosis, which occurred in from two to three hours. At the latter time the differences, if any, were very slight. The specific serum thus seemed to allow the phagocytosis to occur more quickly.

The difference between the opsonic power in vitro of the normal serum and the specific serum, however, has so far been slight. This slight increase of opsonic power of the specific serum was apparent after the second bleeding and continued up to and including the eighth bleeding, but the serum from the next two bleedings (ninth and tenth) showed no definite difference in phagocytosis between normal serum controls and specific serum. The serum from the ninth bleeding, however, showed a protective power for mice similar to that of the serum from the eighth bleeding, and the serum from the tenth bleeding prolonged life. As the control animals in these experiments all died, the absolute protective power of these sera is not known. From these data all that can be said is that while the phagocytic power in vitro of a certain specific serum seemed no greater than that of the control serum, yet the former possessed marked protective power in mice. One of the

heterologous strains (Pn. 4) showed clumping and marked phagocytosis with Sheep Serum II. (inoculated with Pneumococcus mucosus), while with Sheep Serum I. (inoculated with Pn. 36) it showed no clumping and less phagocytosis, and yet mice were protected from it by this latter serum. All of the pneumococcus mucosus strains showed very slight phagocytosis in any serum, and yet with Sheep Serum II. mice were protected from all of the strains with but one exception.

It seems from these observations that the degree of phagocytosis in vitro with some sera at least is not an indication of the degree of protective power in mice.

In regard to the influence of heat upon the phagocytic power of these sera, the following results have been obtained: 60 degrees C. for a half hour has slight deleterious effect, 65 degrees for twenty minutes has more, and 60 degrees for one hour has a marked effect.

Poured blood-agar plates after two hours at 36 degrees C. show a decrease in the number of colonies with all the strains which agglutinated, but the decrease is no greater than could probably be accounted for by the agglutination.

Summary and Conclusions.

1. Typical pneumococci were present during the winter months in the throat secretions of a large percentage of healthy individuals in city and country.

2. A higher percentage of atypical strains of pneumococci have been obtained from healthy persons than from those suffering from pneumonia. In the latter cases the atypical strains may have been overlooked, because of the larger number of typical pneumococci present. Many of the atypical strains seem to be closely related to the streptococci.

3. The so-called streptococcus mucosus Schottmüller, which has hitherto been classed with the distinct streptococci, is placed as a definite variety among the pneumococci, and it is recommended that the name be changed to streptococcus lanceolatus, var. mucosus.

4. A lower percentage of strains of pneumococci virulent for rabbits in the doses used has been obtained from normal cases by rabbit inoculations of mass cultures than from cases of pneumonia by the same method.

5. Since the virulence of pneumococci may be rapidly increased for a susceptible species of experimental animal by successive passage, and since pneumococci obtained from most pneumonias are more virulent for experimental animals than are those obtained from healthy individuals, therefore the virulence of pneumococci from cases of human infection is probably increased for human beings; hence cases of pneumonia should be considered to a certain degree as contagious and, since the virulence of the pneumococcus may be quickly increased and since the organism is very prevalent in normal sputum, all possible measures should be taken to restrict public expectoration.

6. By repeated inoculations into sheep of a pneumococcus strain, a specific protective power of this serum for mice is developed against the homologous strain and against certain other strains, one morphological variety (streptococcus lanceolatus, var. mucosus) being thus clearly differentiated from other strains.

7. Coincident with this production of protective power, a slight specific increase of the sheep serum in phagocytic power in vitro has been observed with some strains of pneumococci, all strains of streptococcus lanceolatus, var. mucosus, acting similarly with the serum produced by the inoculation of one strain; the strains of some other varieties, however, have shown no definite relationship between the phagocytic power and the protective power of the serum.

A STUDY OF THE PNEUMOCOCCUS DURING THE SUMMER OF 1905.

By M. Alice Asserson, M. D.,

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During the summer of 1905, the study concerning the presence of pneumococci, especially in normal individuals, was continued, because it was thought that the influence of season might be shown to be considerable. It was felt to be unnecessary to duplicate the entire number of places previously studied, but the results obtained may very fairly be compared with those during the winter of 1904-5 (see page 571).

During the course of the work we isolated a number of pneumococci from normal throats at the Foundling Asylum, and we therefore decided to make a comparative study of the same cases after an interval of one month with a view to noting the persistence of the organism, and whether or not there was a change in virulence.

The following table will show that out of the six cases examined in July, five show the persistence of the organism one month later. The virulence, however, had slightly lessened in each case.

Normal Cases from Foundling Hospital—July 6 to August.

Number of Cases.	Pn. Isolated.		Not isolated.	Morphology.	Inulin Test.*	Virulence Test. Broth Culture: Dose from 4 c. c.–1/100,000 c. c. in ear vein of rabbit.
	Typical.	Atypical.				
N. 86	+	..	..	Elongated diplococci of medium size, occurring singly..	+24 hrs.	—Rabbit 3 c. c. subcut. alive.
N. 87	+	..	..	Rather large elongated pointed diplococci showing capsules	+48 hrs.	† 1/1,000 c. c. in 3 days.
N. 88	+	..	..	Lance-shaped diplococci occurring singly. No capsules present	+24 hrs.	† 4 c. c. in 3 days.
N. 89	..	+	..	Lance-shaped diplococci occurring singly. No capsules present	+24 hrs.	† 4 c. c. in 2 days.
N. 90	+	..	..	Medium-sized lance-shaped diplococci with capsules...	+24 hrs.	† 1/10 c. c. in 2 days.
N. 91	+	..	..	Medium-sized lance-shaped diplococci with capsules...	+24 hrs.	† 1/10,000 in 3 days.
N. 92 same as N. 86 Aug. 28 1 month later	..	+	..	Small lance-shaped diplococci singly and in short chains. No capsules	+48 hrs.	—3 c.c. subcut. alive.
N. 93 same as N. 87 1 month later	+	..	..	Medium-lance shaped organisms (25) singly and in short chains, no capsule...	+24 hrs.	† 1/10 c. c. in 24 hrs.
N. 94 same as N. 88 1 month later	..	..	+	....	......	....
N. 95 same as N. 89 1 month later	+	..	..	Small lance-shaped diplococci singly and in very short chains with several capsules	+24 hrs.	† 4 c. c. in 3 days.

* The sign + in this column means coagulation of the medium.

Normal Cases from Foundling Hospital—July and August.

Number of Cases.	Pn. Isolated. Typical.	Pn. Isolated. Atypical.	Not Isolated.	Morphology.	Inulin Test.*	Virulence Test. Broth Culture: Dose from 4 c. c.–1/1,000 c. c. in ear vein of rabbit.
N. 96 same as N. 90, 1 month later..........	+	..	..	Medium elongated pointed diplococci singly showing some capsules..............	+24 hrs.	—3 c. c. subcutaneously—alive.
N. 97 same as No. 91, 1 month later..........	+	..	..	Medium lance-shaped diplococci singly and in a few short chains surrounded by capsules..................	+24 hrs.	† 1/1,000 c. c. in 3 days.
N. 98..............	..	..	+	....	......	....
N. 99..............	+	..	..	Elongated pointed lance-shaped 2's surrounded by small capsules............	+24 hrs.	† 4 c. c. in 24 hrs.
N. 100..............	+	..	..	Elongated lance-shaped diplococci of medium size; also spherical diplococci, surrounded by large capsules......................	+ 3 days.	† 1/10 c. c. in 24 hrs.
N. 101..............	..	..	+	....	......	....
N. 102..............	..	..	+	....	......	....
N. 103..............	+	..	..	Medium lance-shaped diplococci showing no capsules.	+ 2 days.	—3 c. c. subcutaneously—alive.

* The sign + in this column means coagulation of the medium.

Normal Cases from the Research Laboratory—September 7, 1905.

Number of Cases.	Pn. Isolated. Typical.	Pn. Isolated. Atypical.	Nor Isolated.	Morphology.	Inulin Test.*	Virulence Test. Dose of Broth Culture.
N. 104..............	+	..	....	Small lance-shaped diplococci surrounded by capsules....	+24 hrs.	Not tested; could not get growth from plates or ascitic broth cultures.
N. 105..............	+	..	....	Small diplococci, ovoid in shape, surrounded by capsules......................	+3 days.	† Rabbit 4 c.c. in 2 days. † Mouse, 1/100,000 in 6 days.
N. 106..............	+	..	....	Small lance-shaped diplococci surrounded by capsules....	+24 hrs.	—Rabbit did not die. † Mouse, 1/100,000 in 2 days.
N. 107..............	+	..	....	Small lance-shaped ovoid diplococci singly and ecapsulated....................	+24 hrs.	† Rabbit 4 c.c. in 4 days. † Mouse 1 c.c. in 24 hours.
N. 108..............	+	..	....	Small lance-shaped diplococci with slender capsules......	+24 hrs.	—Rabbit with 4 c.c. didnot die. † Mouse died with 1/100 c.c. in 24 hours.

* The sign + in this column means coagulation of the medium.

Normal Cases from Laboratory at Fifty-fifth Street—September 15, 1905.

Number of Cases.	Pn. Isolated. Typical.	Pn. Isolated. Atypical.	Not Isolated.	Morphology.	Inulin Test.*	Virulence Test.
N. 109	..	+	..	Very small elongated pointed diplococci singly and in short chains. No capsules.	+3 days.	—Rabbit, 4c.c. did not die. —Mouse, 1/100 c.c. did not die.
N. 110	+	..	..	Medium-sized lance-shaped diplococci surrounded by large capsules	+24 hrs.	† Rabbit, 4c.c. died in 3 days. —Mouse, 1/100 c.c. did not die.
N. 111	+	..	..	Small lance-shaped diplococci	+3 days.	—Rabbit, 4c.c. did not die. —Mouse, 1/100 c.c. did not die.
N. 112	..	..	+	....	....	
N. 113	+	..	..	Small lance-shaped diplococci showing medium-sized capsules	+24 hrs.	—Rabbit, 4c.c. did not kill. —Mouse, 4c.c. did not kill.

* The sign + in this column means coagulation of the medium.

Bellevue Students—October 18, *to November* 1, 1905.

Number of Cases.	Pn. Isolated. Typical.	Pn. Isolated. Atypical.	Not Isolated.	Morphology in Smears from Heart's Blood of Animals.	Inulin Test.*	Virulence Test.
C. 22, same as N. 125, 14 days later	+	..	..	Large diplococci more ovoid than lance-shaped showing capsules	+4 days.	†Mouse, 1/100,000 in 3 days. —Rabbit, 3c.c. subcut.—did not die.
C. 23, same as N. 130, 17 days later	+	..	..	Small elongated pointed diplococci surrounded by small capsules	+24 hrs.	-Mouse, ½c.c. subcut.—did not die. †Rabbit, 4c.c. in 2 days.
N. 124	..	+	..	Small diplococci lance-shaped singly and in clumps of short chains	+24 hrs.	—Mouse, ½c. —Rabbit, 3c.c. subcut.—did not die.
N. 125	+	..	..	Small diplococci, some elongated others more flattened. Small capsules present	+2 days.	†Mouse, 1/100 c.c. in 4 days. —Rabbit, 3c.c. subcut.—did die.
N. 126	..	..	+	....	....	....

* The sign + in this column means coagulation of the medium.

Number of Cases.	Pn. Isolated. Typical.	Pn. Isolated. Atypical.	Not Isolated.	Morphology in Smears from Heart's Blood of Animals.	Inulin Test.*	Virulence Test.
N. 127, sl. cold.....	..	+	..	Small diplococci, few elongated and pointed, others more spherical. Singly and in short chains............	+2 wks.	—Mouse, 1/100c.c. —Rabbit, 3c.c. subcut.—did not die.
N. 128.............	..	+	..	Small sl. elongated diplococci also flattened diplococci singly and in short chains. No capsules..............	—	†Mouse, 1/100c.c. in 5 days. —Rabbit, 3c.c. subcut.—did not die.
N. 129.............	..	..	+	....	....	....
N. 130.............	+	..	..	Medium sized lance-shaped diplococci................	+48 hrs.	—Mouse, 1/100c.c. —Rabbit, 3c.c. subcut.—did not die.
N. 131.............	+	..	..	Medium sized lance-shaped diplococci singly and in short chains with large capsules.................	+48 hrs.	....
N. 132.............	..	..	+	....	....	....
N. 134.............	..	..	+	....	....	....
N. 135.............	+	..	..	Small elongated and pointed diplococci showing large capsules..................	+6 days.	†Mouse, 100 c.c. in 2 days. †Rabbit, 4 c.c. in 6 days.
N. 136. Same as N.131, 14 days later.........	+	..	..	Medium sized lance-shaped diplococci with large capsules.	+7 days	†Mouse, 1-100 c.c. in 2 days. —Rabbit, 3 c.c. subcut.—did not die.
N. 137. Same as N. 124, 14 days later.........	+	..	..	Large lance-shaped diplococci with capsules..............	—Did not grow inulin	†Mouse, 1-100,000 in 2 days. —Rabbit, 4 c.c. did not die.
N. 138. Same as N. 126, 14 days later.........	..	..	+			
N. 139. Same as N. 128, 14 days later.........	+	..	..	Small lance-shaped diplococci singly and in long chains, with capsules..............	—Did not grow.	—Mouse, ½ c.c. subcut. did not die. †Rabbit, 4 c.c. in 18 days.
N. 140 (Sl. cold)....	..	..	+	....	....	....

* The sign + in this column means coagulation of the medium.

Cases from Quarantine Hospital—June 15, 1905.

Number of Cases.	Pn. Isolated.		Not Isolated.	Morphology.	Inulin Test.*	Virulence Test.**
	Typical.	Atypical.				
Q. 2	..	..	+	....	....	....
Q. 3	+	..	..	Elongated lance-shaped diplococci occurring singly and in short chains	+ 24 hrs.	— 4c.c. did not kill.
Q. 4	+	..	..	Ovoid and elongated diplococci occurring singly and in short chains surrounded by small capsules	+ 24 hrs.	— 4c.c. did not kill.
Q. 5	..	+	..	Medium sized lance-shaped diplococci occurring singly. No capsules	+ 24 hrs.	— 4c.c. did not kill.

* The sign + in this column means coagulation of the medium.
** Virulence was tested with 24 hr. ascitic broth culture.

The above table shows the results obtained from a few cases from the Quarantine Hospital. These patients were detained at the hospital on account of certain indefinite symptoms—not pneumonia. As they represented different foreign countries, and had been at sea for a period of several days, it was considered interesting to ascertain to what extent they harbored the pneumococcus. As may be seen from a study of this table, the pneumococcus was isolated from 3 out of 4 cases, but none of these were virulent.

All Normal Cases.	Number of Cases.	Pn. not Isolated.	Pneumococci Isolated.	
			Atypical.	Typical
Research Lab. (Sept. 7, 1905)	5	....	....	5
Diagnostic Lab. (55th St.)	5	1	1	3
Quarantine Station Immigrants	5	....	....	5
Bellevue Students	18	7	2	9
Foundling Hospital	18	4	3	11

The work during the winter months showed that the pneumococci from normal cases were virulent in 69 per cent. of the cases when 4 c.c. of a serum broth culture was injected into rabbits and in 31 per cent. when only 1 c.c. was employed.

In the above cases examined during the summer the results were as follows:

With a 4 c.c. dose .... 33 per cent.
With a 0.1 c.c. dose .... 7 "

A COMPARISON OF PNEUMOCOCCUS STRAINS IN RECENT AND ORIGINAL TESTS.

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The accompanying tables give the results of a recent study of some of the pneumococcus strains isolated during the past year, as compared with their morphology and reactions when first observed.

Very few strains are now found to be entirely typical morphologically. The majority show very small organisms and increased chain formation, and some are decidedly atypical in either serum broth or plate cultures, or in both. Unless extremely small, size of organisms has not been considered in the present division into characteristic and non-characteristic strains, this division being based upon the general morphological picture.

Of the 27 pneumonia cultures studied, 9 coagulated inulin not later than in the original tests, 7 of these fairly characteristic morphologically, 2 not characteristic; 6 coagulated later than in original tests, 5 characteristic, 1 not characteristic; while 12 did not coagulate in the recent tests, although all gave a positive coagulation when first tested; 7 of these characteristic, 5 not characteristic. When first studied, 19 were typical, 8 fairly typical.

23 cultures from normal cases were studied, 8 of these coagulated inulin not later than in first tests, 4 of these characteristic, 4 not characteristic; 2 coagulated later than in first tests, both characteristic; 13 did not coagulate at this time, although positive in original tests. Of the latter, 8 are characteristic, 5 not characteristic. When first studied, 13 were typical, 4 not characteristic and 6 atypical.

Of the 11 cultures from miscellaneous cases, 4 coagulated inulin not later than when first studied, 2 characteristic, 2 not characteristic; 2 coagulated later, 1 characteristic, 1 not, and 5 failed to coagulate, although positive in original tests, 4 of these characteristic, 1 not characteristic. In original tests, 6 were typical, 5 not characteristic.

No detailed account is given in these tables of original mannite coagulations. Only 8 of the 61 strains recently tested coagulated mannite,

5 from pneumonia cases, 2 from normal, 1 miscellaneous. Of 5 cultures from normal cases originally tested in mannite, 3 coagulated, 2 did not; all of these were negative in the recent tests.

Several of the strains now found to be negative for inulin, although positive when first tested, were inoculated into rabbits and mice in large doses. Of 9 mice inoculated, eight have died. From five of these, there are typical cultures, and capsules in heart smears, but so far, no coagulation of inulin. Of the rabbits, only one has died. From this rabbit, inoculated with N-91, there are typical pneumococcus cultures, capsules, and inulin coagulated on second day; mannite negative. Inulin and mannite cultures made from serum broth culture before inoculation into animal remain uncoagulated.

Cultures from 36, a typical pneumcoccus, and from 47, a capsule coccus, both originally virulent, were carried on for many generations in serum broth, on rabbit's blood agar, horse blood agar, rat blood agar and mouse blood agar. In July and August, these were tested for virulence on rabbits, mice and rats. Both 36 and 47 were found to have decidedly lost virulence, 36 in greater proportion than 47, although in the original test 36 was one of the most virulent organisms isolated. In a further test of virulence made in October with cultures of this series, 36 was found to have entirely lost virulence for rabbits when inoculated in 4 c.c. doses, and was no longer virulent for mice unless given in large doses of a strong emulsion, 47 also now failed to kill rabbits in 4 c.c. doses; mice inoculated with 1/10 c.c. died, but the organism was not recovered at autopsy. Some difference in virulence was noticed in the cultures from these strains carried on upon different media, but on the whole, the results were irregular, and further tests would be necessary before drawing any definite conclusions. The coagulation of inulin and mannite has also been irregular in the cultures of these series. In earlier cultures all coagulated. Of those still living at the present time, the results of recent coagulation tests were as follows:

36—horse blood agar—Inulin coagulated in 24 hours; mannite not coagulated.

36—rabbit blood agar—Inulin coagulated in 24 hours; mannite not coagulated.

36—rat blood agar—Inulin coagulated in 48 hours; mannite not coagulated.

47—horse blood agar—Inulin coagulated in 24 hours; mannite coagulated in 8 days.

47—rabbit blood agar—Inulin not coagulated in several tests, though showing abundant growth, mannite also negative.

Organisms from the 47-rabbit blood agar series are decidedly atypical in morphology, and both in serum broth and plate cultures now show as much resemblance to streptococcus as to pneumococcus. One set of 36 cultures carried on among the regular laboratory stock strains now also shows a very atypical morphology, and fails to coagulate inulin. Further studies with cultures from these two cases are still in progress.

36 1001

Series.	Date of Inoculation.	Animal.	Weight Grams.	Culture Inoculated. Amount.	Transfers since Isolation.	Transfer on Special Medium.	Result.
	1905.						
Serum broth	June 27	Rabbit..	910	.001 cc	73	18	Lived.
	June 27	Rabbit..	950	.00001 cc	73	18	"
	June 27	Mouse..	...	.001 cc	73	18	2 days.
	June 27	Mouse..	...	.0001 cc	73	18	8 "
Horse blood agar	June 27	Rabbit..	860	.001 cc	73	*17	6 "
	June 27	Rabbit..	910	.00001 cc	73	17	Lived.
	June 27	Mouse..	...	.001 cc	73	17	8 days.
	June 27	Mouse..	...	.00001 cc	73	17	6 "
Rabbit blood agar	June 27	Rabbit..	920	.001 cc	59	*15	8 "
	June 27	Rabbit..	960	.00001 cc	59	15	8 "
	June 27	Mouse..	...	.001 cc	59	15	8 "
	June 27	Mouse..	...	.00001 cc	59	15	6 "
	June 30	Mouse..	...	.001 cc	59	15	10 "
	June 30	Mouse..	...	.00001 cc	59	15	6 "
	June 30	Rat.....	...	.1 cc	59	15	Lived.
	June 27	Rat.....	...	.001 cc	59	15	6 days.
	June 27	Rat.....	...	.1 cc	59	15	13 "
	June 27	Rat.....	...	.001 cc	59	15	Lived.
Rat blood agar	June 27	Rabbit..	930	.001 cc	72	*17	"
	June 27	Rabbit .	850	.0001 cc	72	17	"
	June 27	Mouse..	...	.001 cc	72	17	8 days.
	June 27	Mouse..	...	.00001 cc	72	17	6 "
	June 27	Rat.....	...	.01 cc	72	17	13 "
	June 27	Rat.....	...	.001 cc	72	17	Lived.
Mouse blood agar	June 27	Rabbit..	900	.001 cc	73	17	"
	June 27	Rabbit..	800	.00001 cc	73	17	8 days.
	June 27	Mouse..	...	.001 cc	73	17	8 "
	June 27	Mouse..	...	.00001 cc	73	17	6 "

* Plus one serum broth culture inoculated.

Original virulence—

Mouse, .000001 cc—2 days.

Rabbit, .000005 cc—2 days.

Cultivation on Various Media.

47 1001

Series.	Date of Inocula-tion.	Animal.	Weight Grams.	Culture Inoculated. Amount.	Transfers since Isolation.	Transfer on Special Medium.	Result.
	1905.						
Serum broth	June 30	Rabbit..	1040	4. cc	83	22	11 days.
	June 30	Rabbit..	1010	.1 cc	83	22	15 "
	June 29	Mouse..	....	.5 cc	81	20	1 day
	June 29	Mouse..	....	.1 cc	81	20	1 "
	June 29	Mouse..	....	.01 cc	81	20	1 "
Horse blood agar	June 26	Rabbit..	1080	4. cc	81	*21	Lived.
	June 26	Rabbit..	804	.1 cc	81	21	"
	June 26	Mouse..	....	.5 cc	81	21	2 days.
	June 26	Mouse..	....	.1 cc	81	21	2 "
	June 26	Mouse..	....	.01 cc	81	21	2 "
Rabbit blood agar	June 30	Rabbit..	1090	4. cc	89	*18	Lived.
	June 30	Rabbit..	1000	.1 cc	89	18	"
	June 30	Mouse..	....	.5 cc	78	*17	4 days.
	June 30	Mouse..	....	.1 cc	78	17	2 "
	June 30	Mouse..	....	.1 cc	78	17	4 "
	June 30	Rat.....	....	.01 cc	78	17	8 "
Rat blood agar	June 30	Rabbit..	1020	3. cc	77	*19	5 days.
	June 30	Rabbit..	1040	.1 cc	77	19	Lived.
	June 29	Mouse..	....	.5 cc	77	*17	1 day.
	June 29	Mouse..	....	.1 cc	77	17	6 days.
	June 29	Mouse..	....	.01 cc	77	17	4 "
	June 30	Rat.....	....	4. cc	79	*91	1 day.
	June 30	Rat.....	....	.1 cc	79	19	6 days.
	June 29	Rat.....	....	4. cc	77	*16	1 day.
	June 29	Rat.....	....	.1 cc	77	16	6 days.
Mouse blood agar	June 29	Rabbit..	1400	4. cc	80	*14	Lived.
	June 29	Rabbit..	1040	1. cc	80	14	"
	June 29	Mouse..	....	.5 cc	80	14	6 days.
	June 29	Mouse..	....	.1 cc	80	14	7 "
	June 29	Mouse..	....	.01 cc	80	14	14 "

* Plus one serum broth culture inoculated.

Original virulence—

Mouse, .00001 cc—2 days.

Rabbitt, 4.cc—3 days.

Summary of Inulin Tests Made January, 1906, upon Strains of Pneumococci Isolated at Different Periods between November, 1904, and March, 1905, Compared with Similar Tests Made Soon after Isolation. All Positive in Original Tests.

	Coagulated not later than in Original Test.		Coagulated later than in Original Test.		Not Coagulated this Time, though Coagulated in Original Test.		Total.
	Characteristic.	Not Characteristic.	Characteristic.	Not Characteristic.	Charac-teristic.	Not Char-acteristic.	
Pneumonia Cases.	8_{1001}	18_{1122}	15_{1112} 3 days later	22_{1001} 2 days later	4_{1001}	20_{1122}	
	*9_{1001}	77_{1001}	39_{1001} 2 "			21_{1122}	
	13_{1001}		*47_{1122} 2 "		62_{1112}	36_{1001}	
	66_{1001}		57_{1122} 8 "		67_{1001}	*47_{1001}	
	56_{1112}		83_{1001} 10 "		72_{1001}		
	69_{1001}				75_{1001}	73_{1001}	
	82_{1322}				76_{1001}		
					98_{1122}		
	7	2	5	1	7	5	
	$\underbrace{\qquad}_{9}$		$\underbrace{\qquad}_{6}$		$\underbrace{\qquad}_{12}$		27
Normal Cases.		N. 106_{1112}					
	N. 41_{1122}	N. 111_{1001}	N.89_{1122} 8 days later		N. 23_{1122}	*N. 10_{1112}	
	N. 124_{1001}	N. 127_{1112}			N. 51_{1122}	N. 11_{1122}	
	N. 135_{1122}	N. 113_{1001}	N.99_{1122} 9 days later		N. 52_{1122}	N. 43_{1122}	
	N. 136_{1212}				N. 59_{1122}	N. 45_{1001}	
						N. 107_{1111}	
					N. 91_{1222}		
					N. 100_{1122}		
					N. 109_{1112}		
					N. 130_{1112}		
	4	4	2	0	8	5	
	$\underbrace{\qquad}_{8}$		$\underbrace{\qquad}_{2}$		$\underbrace{\qquad}_{13}$		23
Miscellaneous Cases.	C. & D. 4_{1001}	C. 23_{1112} Me. 1_{1122}	C. 5_{1122} 1 day later	Me. 2_{1112} 3 days later	C. & D. 8_{1001}	*C. 4_{1122}	
					T. 3_{1122}		
	Q. 5_{1122}				Q. 3_{1001}		
					C. 23_{1122}		
	2	2	1	1	4	1	
	$\underbrace{\qquad}_{4}$		$\underbrace{\qquad}_{2}$		$\underbrace{\qquad}_{5}$		11
						Total............	61

* Pneumococcus Mucosus.

PNEUMOCOCCUS STRAINS.

Morphology and Inulin Coagulations January, 1906, Compared with Similar Tests Made Soon After Isolation (from November, 1904, to August, 1905).

Pneumonia Cases.

	*Original Tests.					Tests made in January, 1906.			
	Morphology.	Capsule.	Virulence.		Inulin Coag.	Inulin Coag.	Mannite Coag.	Plate.	Smears from Serum Media.
			Mouse.	Rabbit.					
4/1001	Large Typ. Pn. ..	—	1/2 c.c., alive.	3 c.c., alive.	+ 3 days	— 14 days	— 14 days	Fairly Typ. Pn.......	Not characteristic.
8/1001	Typ. Pn..........	—	Not inoc.	Not inoc.	+ 2 "	+ 2 "	— 14 "	Typ. Pn.............	"
9/1001	Typ. Caps. Coccus	+	1/2 c.c., alive.	3 c.c., alive.	+ 2 "	+ 2 "	+ 5 "	....	Typical Pn.
13/1001	Typ. Pn..........	—	1/200 c.c., 1 day.	1/10 c.c., 2 days.	+ 2 "	+ 2 "	+ 2 "	....	Fairly typical Pn.
15/1112	"	+	1/1,000 c. c., 2 days.	3 c.c., alive.	+ 1 day.	+ 4 "	— 14 "	Fairly Typ. Pn.......	Typical Pn.
18/1122	"	?	Not inoc.	1/10 c.c., 7 days	+ 2 days	+ 2 "	— 14 "	Not characteristic....	Not characteristic.
20/1222	Fairly Typ. Pn. ..	+	....	....	+ 1 day.	— 14 "	— 14 "	"	
21/1122	" ...	—	Not inoc.	4 c.c., 1 day.	+ 1 "	— 14 "	— 14 "	Atypical.............	Not characteristic.
22/1001	" ...	—	"	4 c.c., 1 day.	+ 2 days	+ 4 "	— 14 "	Not characteristic....	"
36/1001	Typ. Pn..........	—	1/1,000,000 c.c., 2 days	1/5,000, 2 days.	+ 1 day.	— 14 "	— 14 "	Very atypical.........	Very atypical.
39/1001	Fairly Typ. Pn. ..	—	Not inoc.	1/10, 4 days.	+ 4 days	+ 2 "	+ 5 "	Fairly typical.........	Not characteristic.
47/1001	Typ. Caps. Coccus	+	1/100, 2 days.	4 c.c., alive.	+ 3 "	— 14 "	— 14 "	Atypical.............	Atypical.
47/1122	"	+	1/100,000 c.c., 2 days	4 c.c., 3 days.	+ 1 day.	+ 3 "	+ 3 "	Typ. Caps. Coccus...	Fairly typical.
56/1112	Typ. Pn..........	?	1/100, 25 days.	3 c.c., alive.	+ 2 days	+ 2 "	— 14 "	Typ. Pn.............	
57/1122	"	Indicated.	1/100, 1 day.	4 c.c., 1 day.	+ 2 "	+ 10 "	— 14 "	"	
62/1112	Fairly Typ. Pn. ..	—	1/2 c.c., 3 days.	3 c.c., alive.	+ 4 "	— 14 "	— 14 "	Not characteristic....	Typical Pn.

	*Original Tests.					Tests made in January, 1906.			
	Morphology.	Capsule.	Virulence.		Inulin Coag.	Inulin Coag.	Mannite Coag.	Plate.	Smears from Serum Media.
			Mouse.	Rabbit.					
66/1001	Typ. Pn..........	—	Not inoc.	Not inoc.	+ 4 days	— 14 days	— 14 days	Atypical.	Atypical.
67/1001	"	—	"	"	+ 2 "	— 14 "	— 14 "	Typ. Pn..............	Not characteristic.
69/1001	"	—	"	"	+ 2 "	+ 2 "	— 14 "	Fairly typical.........	"
72/1001	Fairly Typ. Pn. ..	—	"	"	+ 2 "	— 14 "	— 14 "	"	Fairly typical.
73/1001	" ...	—	"	"	+ 3 "	— 14 "	— 14 "	Atypical.	Atypical.
75/1001	Typ. Pn..........	—	"	"	+ 2 "	— 14 "	— 14 "	Typ. Pn..............	
76/1001	"	—	"	"	+ 1 day.	— 14 "	— 14 "	Fairly typical Pn.....	Not characteristic.
77/1001	"	—	"	"	+ 2 days	+ 2 "	— 14 "	Not characteristic....	
82/1322	"	+	"	1/10 c.c., 2 days	+ 3 "	+ 2 "	— 14 "	Fairly typical.........	Not characteristic.
83/1001	"	—	"	Not inoc.	+ 1 day.	+ 11 "	— 14 "	"	Fairly typical.
98/1122	"	+	"	4 c.c., alive.	+ 1 "	— 14 "	— 14 "	"	Not characteristic.

* Special stains for capsule not made until after passage through animals. Where no capsule was found with 1001, the entries refer to staining with ordinary stain.

Miscellaneous Cases.

	* Original Tests.					Tests made in January, 1906.			
	Morphology.	Capsule.	Virulence.		Inulin Coag.	Inulin Coag.	Mannite Coag.	Plate.	Smears from Serum Media.
			Mouse.	Rabbit.					
C. & D. 4/1001	Typ. Pn..........	Indic.	....	....	+ 2 days	+ 2 days	— 14 days	Fairly typical.........	Very typical.
C. & D. 8/1001	"	"	....	....	+ 2 "	— 14 "	— 14 "	Typical Pn...........	Fairly "
T. 3/1122	"	—	Not inoc.	3 c.c., 1 day	+ 1 day	— 14 "	+ 10 "	"	Very "
Q. 3/1001	"	—	"	Not inoc.	+ 1 "	— 14 "	— 14 "	"	Not characteristic.
Q. 5/1122	Typ. Pn..........	—	"	1/10 c.c., 5 days	+ 1 "	+ 1 day	— 14 "	Maj. typ. Pn..........	Typical Pn.
C. 4/1122	Typ. Caps. Coccus	+	1/10000, 4 days	1/10 c.c., 8 "	+ 9 days	— 14 days	— 14 "	Atypical.............	Fairly typical.
C. 5/1122	Not char. Pn......	—	Not inoc.	3 c.c. alive.	+ 2 "	+ 3 "	— 14 "	Typical Pn...........	"
C. 23/1112	"	+	"	4 c. c., 8 days..	+ 1 day	+ 1 day	— 14 "	....	Atypical.
C. 23/1122	"	—	"	4 c.c., 8 " ..	+ 1 "	— 14 days	— 14 "	Typical Pn...........	Fairly typical.
Me. 1/1122	"	+	1/1000, 3 days	1/1000, 3 " ..	+ 7 days	+ 7 "	— 14 "	Not characteristic	Not characteristic.
Me. 2/1112	"	+	1/1000, 2 "	3 c.c., 1 day	+ 1 day	+ 4 "	— 14 "	"	"

* Special stains for capsule not made until after passage through animals. Where no capsule was found with 1001, the entries refer to staining with ordinary stains.

Normal Cases.

	* Original Tests.					Tests made in January, 1906.			
	Morphology.	Capsule.	Virulence.		Inulin Coag.	Inulin Coag.	Mannite Coag.	Plate.	Smears from Serum Media.
			Mouse.	Rabbit.					
N. 10/1112	Typ. Caps. Coccus	+	1/1000, 2 days.	Not inoc.	+ 2 days	—14 days	—14 days	Not characteristic....	Not characteristic.
N. 11/1122	Large Typ Pn....	+	1/100, 4 days.	"	+ 2 "	—14 "	—14 "	"	"
N. 23/1122	Typ. Pn..........	+	Not inoc.	4 c. c.	+ 3 "	—14 "	—14 "	Typical Pn..........	"
N. 41/1122	Pn. Caps. Coccus.	+	"	4 c.c. 1 d.,alive	+ 5 "	+ 3 "	—14 "	"	Fairly typical.
N. 43/1122	Atyp. Pn.........	—	"	4 c. c., 2 days.	+ 4 "	—14 "	—14 "	Not characteristic....	Not characteristic.
N. 45/1001	Not char. Pn.....	—	"	4 c. c., 12 "	+ 4 "	—14 "	—14 "	Atypical.............	"
N. 51/1122	Atyp. Pn.........	Indicat.	"	4 c. c., 3 "	+ 5 "	—14 "	—14 "	Typical Pn..........	Fairly typical.
N. 52/1122	"	—	"	4 c. c., 11 "	+ 5 "	—14 "	—14 "	Fairly typical.........	"
N. 59/1122	Typ. Pn..........	Indicat.	"	1/10 c.c.,6 days	+ 8 "	—14 "	—14 "	"	"
N. 88/1122	"	?	"	4 c. c., 3 days.	+ 5 "	—14 "	—14 "	Fairly typical.........	Typical Pn.
N. 89/1122	"	—	"	4 c. c., 2 "	+ 1 day	+ 9 "	—14 "	Very typical.........	"
N. 91/1222	"	+	"	1 1000 c. c.,3 d.	+ 1 "	—14 "	—14 "	Fairly typical.........	Fairly typical.
N. 99/1122	"	+	"	4 c. c., 1 day.	+ 1 "	+10 "	—14 "	Typical Pn..........	"
N. 100/1122	Not char. Pn......	+	"	1/10 c. c., 1 day	+ 3 days	—14 "	+11 "	....	Typical Pn.
N. 106/1112	Typ. Pn..........	+	1/100000,2 days	3 c. c., alive.	+ 1 day	+ 1 day	—14 "	Not characteristic....	Not characteristic.
N. 107/1111	Not char. Pn......	+	Not inoc.	Not inoc.	+ 3 days	—14 days	—14 "	"	Fairly characteristic.
N. 109/1112	Atyp. Pn	—	1/100, alive.	4 c. c., alive.	+ 3 "	—14 "	—14 "	Fairly typical.........	Not characteristic.

N. 111/1001	Tpy. Pn..........	—	Not inoc.	Not inoc.	+	+ 3 days	—10 days	Not characteristic....	Not characteristic.
N. 113/1001	Atyp. Pn.........	—	"	"	+ 1 day.	+ 1 day.	—14 "	"	"
N. 124/1001	"	—	"	"	+ 1 "	+ 1 "	—14 "	Fairly typical.........	Fairly typical.
N. 130/1112	Typ. Pn..........	?	1/100 c.c., alive	3 c. c., alive.	+ 3 days	—14 days	+ 1 day.	"	"
N. 135/1122	"	+	1/100000, 2 days	4 c. c., 6 days.	+ 1 day.	+ 1 day.	—14 days	Not characteristic....	"
N. 136/1212	"	+	1/100 c. c., 2 d.	3 c. c., 5 "	+14 days	+ 1 "	—14 "	Typical Pn...........	Typical Pn.

* Special stains for capsule not made until after passage through animals. Where no capsule was found with 1001, the entries refer to staining with ordinary stains.

THE APPLICATION OF THE REACTION OF AGGLUTINATION TO THE PNEUMOCOCCUS.

By Katherine R. Collins, M. D.,

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The following report is a part of the work on pneumonia as planned by the Commission for the Investigation of Acute Respiratory Diseases, and by the Department of Health.

Normal serum of various animals differs greatly in its tendency to agglutinate many strains of pneumococci. Thus rabbit serum generally gave negative results, while sheep and horse serum reacted slightly in a few instances, and the serum of one goat of four tested agglutinated a number of strains of pneumococci in dilutions of 1.10.

Neufeld, Clairmont, Landsteiner, Wadsworth, Heyrovsky, and others have succeeded in producing agglutinins for pneumococci in the animal body through immunization.

Gorgàno and Fattori state that agglutination of Diplococcus pneumoniæ with the blood of patients suffering from infection with this organism is constant, that it persists for some time after recovery of the patient, and that the reaction is more marked if the homologous organism be used. The highest reaction obtained by them was, however, in a 1.10 dilution.

We have found that the sera of normal individuals in many instances reacts with the various strains of pneumococci in dilutions of 1.2 and 1.10, hence a higher reaction would be required than was found by these observers for diagnosis.

Glucose broth has been generally recommended as the medium best adapted for making agglutination tests with the pneumococcus, but as the organism quickly dies out in the presence of the excess of acid produced by the fermentation of the sugar, it can be carried through one generation only on this medium, unless it is transferred before the acidity has increased sufficiently to destroy the growth. This fact makes the broth unsuitable for the work.

Marshall and Knox[1] and Morello have shown that the typhoid bacillus loses its agglutinability when grown for some time in an active immune serum. Dr. Park and I have demonstrated the same to be true for the bacillus of dysentery when grown in its immune serum, and we were also able to show, further, that the agglutinability could be restored by long cultivation upon suitable media.

As the presence of serum constituents in the medium is required for the continuous growth of the pneumococcus, it may be assumed from the above facts that the agglutinability of the organism might at least be lowered by long cultivation upon a medium containing even very small amounts of these inhibitory substances. This assumption was borne out by several tests made with an organism taken on the one hand directly from a fresh rabbit-blood-agar culture, and on the other from a culture in calcium broth[2] one generation old and several generations old. The last culture gave the best reaction, while the culture from the blood-agar gave the poorest reaction.

To eliminate this source of error, diluted sheep or hog serum, as suggested by Dr. Park, was boiled to destroy any inhibitory substances present, and added to broth or agar as the case required. Cultures obtained from media containing these sera, when transferred to calcium broth, usually gave a homogeneous growth with much less tendency to spontaneous agglutination than is seen with cultures grown in calcium-glucose broth. Heating the organism to 70 degrees C. for 15 minutes does not affect its agglutinability. Heating the serum to 85 degrees for 15 minutes, however, destroys the agglutinins both for the pneumococcus and the pneumococcus mucosus.[3]

Several methods of immunization were tried. The one which gave the best results is represented by the following example:

Feb. 15—A rabbit was given subcutaneously 3 c.c. of a culture grown for 48 hours in broth, to which a few drops of defibrinated blood were added, heated previously to 60° C. for 30 minutes.

Feb. 28— 5 c.c. of a similar culture administered.

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[1] The studies of Marshall and Knox, so far as I know, have not as yet been published.

[2] The fact that the addition of calcium carbonate to culture media neutralizes the acid formed by the fermentation of sugar during bacterial growth has been recognized for some time. The application of this reaction to the growth of the pneumococcus was suggested independently by Bolduan and Hiss. The former recommended the addition of bits of marble to plain broth, the latter used calcium carbonate in the form of powder in glucose broth. (See Dr. Bolduan's paper, page 613).

[3] A description of this organism will be found in the article by Park and Williams (page 567).

March 8—½ c.c. of a living culture of the same organism was given.
" 13— 1 c.c. of a living culture of the same organism was given.
" 24— 5 c.c. of a calcium-broth culture, heated 70° C. for 15 minutes, given.
April 1— 5 c.c. of a calcium-broth culture, heated 70° C. for 15 minutes, given.
" 8— 5 c.c. of a calcium-broth culture, heated 70° C. for 15 minutes, given.
" 15—10 c.c. of a calcium-broth culture, heated 70° C. for 15 minutes, given.
" 25—10 c.c. of a calcium broth culture, heated 70° C. for 15 minutes, given.
May 1—10 c.c. of a calcium-broth culture, heated 70° C. for 15 minutes, given.
" 8—15 c.c. of a calcium-broth culture, heated 70° C. for 15 minutes, given.
" 15—15 c.c. of a calcium-broth culture, heated 70° C. for 15 minutes, given.
" 21—Animal bled and the serum tested with the homologous organism which it agglutinated in a dilution of 1:200.
May 22—An emulsion heated to 70° C. for 15 minutes from four heated serum-agar plates was injected subcutaneously. Animal dead on the following day.

Hanging drops were chiefly relied on for ascertaining the reactions, though in many instances these were controlled by the macroscopic method and the contents of the tubes examined microscopically after reaction had taken place.

The sources of error seem about equal in the two methods, while the hanging drop has the advantage of shorter time limit of reaction, and of easy recognition of contamination.

With the pneumococcus the tube method generally indicates a higher microscopical reaction than the hanging drop. This is contrary to tests made with the dysentery and typhoid bacilli, and is explained by the fact that in the former case the free organisms must be present in great numbers to cloud the supernatant fluid, whereas in the latter a comparatively small number of free bacilli may render the fluid turbid, so that in the case of the pneumococcus a good reaction viewed macroscopically may become only a fair reaction when viewed microscopically.

Neufeld states that the various strains of the pneumococcus agglutinate alike, an observation probably due to the low reactions obtained by him, since his maximum reaction was 1:50. My work has shown great irregularity in this respect, the serum of an animal immunized with one strain of pneumococcus agglutinating only seven organisms out of seventy tested in dilutions equalling the reaction (1:200) with the homologous organism. Four strains reacted in dilutions of 1:10, eleven in 1:2, while the remaining organisms were entirely negative.

The serum of a second immunized animal agglutinated the homologous organism in dilution of 1:100, while other strains were affected in less dilutions or not at all.

Since the first publication of this article A. Kindborg from Fraenkel's Laboratory at Halle has confirmed these results.

TABLE I.

Agglutination Tests with the Serum of a Sheep[1] *Injected for a Period of Three Months with Pneumococcus No.* 36.

Dilution.	2	10	20	50	100	Control.
Typical pneumococcus 36..	++	++	++	++	+ 1	—
Typical pneumococcus 14..	—	—	..	..	..	—
Typical pneumococcus 4..	++	1	..	..	..	1
Typical pneumococcus 16..	++	—	..	..	..	—
Typical pneumococcus 18..	—	..	..	..	..	—
Typical pneumococcus 33..	—	..	..	..	..	1
Atypical pneumococcus 2..	++	—	..	..	..	—
Atypical pneumococcus 66..	+1	—	..	..	..	1
Pneumococcus mucosus 47.	—	..	..	..	..	—

[1] For the details of the immunization of the sheep, the paper of Drs. Park and Williams is to be consulted.

The remaining sixty-one organisms tested reacted some in dilution of 1:2 and others not at all, thus emphasizing the distinction of pneumococcus No. 36 from the other strains in regard to its power to produce agglutinins.

There is apparently a difference in the agglutinability of the pneumococci, some strains uniformly reacting much more readily than others in normal and immune sera.

Two strains of pneumococci which showed good agglutination with several active sera failed to produce agglutinins to any extent in the animal body for themselves or other strains of pneumococci. Three rabbits and a goat were inoculated without results with one strain, and two rabbits and a horse with the other; and as the same kind of animals was immunized under the same conditions with other strains with good results, this irregularity would seem to indicate a peculiarity of the organism rather than of the animals injected.

Another observation of interest, but one which has not been carried far enough on account of insufficient time to establish definite conclusions, is certain reactions obtained with a streptococcus serum and absorption experiments made with this organism.

A young goat which was immunized with a strain of streptococcus yielded a serum which agglutinated a few pneumococci and its own culture in dilutions of 1:10.

Pneumococcus 66, which coagulated inulin-serum water late, when first isolated and several months later not at all absorbs the agglutinins for several pneumococci from a typical pneumococcus immune serum. This culture is the only one of the pneumococci that has its agglutinins taken out of the above pneumococcus immune serum by the streptococcus; it produces agglutinins in the animal body for itself and many of the pneumococci. These reactions suggest the possibility of the occurrence of intermediate types of organisms between pneumococci and streptococci.

Exhaustion Experiments.

The extreme sensitiveness of the pneumococcus to changes of conditions not readily determined brings about variation in the behavior

of this organism which proved a serious factor in the application of the agglutination reaction and in the interpretation of the results obtained. To eliminate as far as possible any errors arising from this instability, the exhaustion experiments were conducted in groups, each group covering as many observations as practical, in order to insure uniform conditions for a number of tests.

In the exhaustion experiments a slight loss of agglutinins has generally been observed. This loss occurs whether the organism used for absorption is an homologous or a related one or of a foreign type. This fact points to the cause of the loss lying outside of the presence of the organism. The loss is readily estimated on account of its uniformity, and in no way affects the determination of the amount of absorption excepting where a strain reacts only in low dilutions. In this case the disappearance of the agglutinins cannot be ascribed with certainty to the organism used for absorption, and the establishment of relationship by the absorption method is not possible in these instances.

Testing the reaction of the meningitis coccus in antipneumococcus serum, Sorgente failed to obtain agglutination with a number of strains. We failed to absorb the agglutinins from a serum agglutinating several strains of pneumococci in dilution of 1:200 with a culture of the diplococcus of meningitis.

As shown in Table II., the power of the serum to agglutinate pneumococcus Nos. 14 and 72 in equally high dilutions with the homologous organism, and by absorption that the agglutinins are group agglutinins for Nos. 14 and 72 and both group and specific agglutinins in the case of No. 47, the homologous organism is explained very readily by the fact that the two types of agglutinins constantly vary in ratio both in different animals and at different periods of inoculation; the group agglutinins even exceeding at times the specific ones.

The increase of agglutinins for different strains of the pneumococcus mucosus in the serum of an animal inoculated with one of the typical pneumococcus strains, and the results obtained by the absorption of these agglutinins, separate them into a distinct variety from the majority of other pneumococci.

The similar results obtained, as indicated in the following table, by absorption with pneumococcus mucosus No. 47 and pneumococcus No. 4 (the latter organism when studied not producing the characteristic capsule and gelatinous colonies), suggest that these cultural attributes may be lost while the agglutinative affinity is still retained.

TABLE

Serum of a Sheep Injected with Pneumococcus Mucosus (Williams), Showing the Pneumococci, a Strain of Streptococcus.

		Before Exhaustion						
		6	10	20	50	100	200	Control
Pneumococcus mucosus	25	++	++	++	++	++	+ 1	−+
	47	++	++	++	++	++	++	−
	C1	++	++	++	++	+ 1	−	−
	C4	++	++	++	++	++	++	−+
Atypical pneumococci.	2	++	++	++	+	..	..	−
	72	++	++	++	++	++	1	1
Typical pneumococci..	4	++	++	++	++	+ 1	+	−+
	14	++	++	++	++	++	+	−
	11	−+	..	..	..	..	..	−
	36	−	..	..	..	..	..	−
	56	1	..	..	..	..	..	1
Typical pneumcocci: Simple cold	2 C. & D.	1	..	..	..	..	..	1
Typical pneumcocci: Normal....	N. 46	+ 1	+	−+	..	..	..	1

Part of the remaining organisms tested reacted in dilutions of 1:2 and part failed to react even in
++ complete agglutination; + 1 not quite complete; + good; 1 trace; −+ fair; − negative.

II.

Agglutination Index Before and After Absorption with Its Own Group, Typical and Bacillus Typhosus Respectively.

After Exhaustion with Pneumococcus mucosus No. 47.		After Exhaustion with Pneumococcus No. 14.				After Exhaustion with Pneumococcus No. 4.		After Exhaustion with Streptococcus longus.					After Exhaustion with B. typhosus.			
6	20	6	20	50	100	6	20	6	20	50	100	200	6	20	50	100
− +	− +	+ +	+ +	+ +	− +	− +	− +	+ +	+ +	+ +	+ +	− +	+ +	+ +	+ 1	+
−	−	+ +	+ +	+ +	+	1	1	+ +	+ +	+ +	+ +	+	+ +	+ +	+ +	+ 1
+	−	+ +	+ +	+ 1	− +	− +	− +	+ +	+ +	+ 1	+	− +	+ +	+ +	+ 1	+
− +	− +	+ +	+ +	+ 1	+	−	−	+ +	+ +	+ 1	+	− +	+ +	+ +	+ +	− +
+ +	+	+ +	+ +	+	1	−	−	+ +	+ +	− +	1	..	+ +	+ +	+ 1	..
+	−	+	− +	1	..	− +	− +	+ +	+ +	+ +	1	..	+ +	+ +	+	..
+ +	− +	− +	− +	− +	..	−	−	+ +	+ +	+ +	+	..	+ +	+ +	+ 1	2
1	1	− +	1	..	..	1	1	+ +	+ +	+ +	+	..	+ +	+ +	+ +	1

this low dilution.

TABLE

Serum of a Goat Injected during a Period of Three Months with Pneumococcus No. 14 before and after Exhaustion with Pneumococcus No. 66 and Streptococcus longus.

		Before Exhaustion.						After Exhaustion with Pneumococcus No. 66.				After Exhaustion with Streptococcus longus.				
		6	20	50	100	200	Control	6	20	50	100	6	20	50	100	200
Typical Pneumococcus.	4	++	++	++	+1	..	—	—	..	..	..	++	++	++	+	..
Typical "	14	++	++	++	++	+	—	—	..	..	..	++	++	++	+	..
Typical "	22	++	++	++	+	..	—	++	++	—+	..	++	++	+1	..	..
Typical Pneumococcus, Normal......	46	++	++	++	++	+1	—	+1	+1	..	..	+1	+1	—+	..	..
Atypical Pneumococcus	66	++	++	++	+1	—+	—+	—+	..	..	..	—+	—+	..	..	..
Atypical "	2	++	++	++	+1	..	—	+	—	..	..	++	++	++	—+	..
Atypical "	72	++	++	++	++	+	1	++	++	1	..	++	++	++	+1	..

The remaining organisms tested reacted as in Table II. The above tests were made simultan

The irregularity of the pneumococci in their behavior to the agglutination reaction is amply fication based upon the morphological and culture characteristics of the organisms. Atypical typical pneumococci in their agglutination reactions.

The different degrees of partial exhaustion of agglutinins for normal culture No. 46 suggests as to the streptococcus longus.

III.

Serum of a Horse Injected during a Period of Three Months with Pneumococcus No. 14 before and after Exhaustion with Pneumococci Nos. 22 and 72.

Before Exhaustion.					After Exhaustion with Pneumococcus No. 22.				After Exhaustion with Pneumococcus No. 72.		
6	20	50	100	200	6	20	50	100	6	20	50
+	1	....	....	....	+	—	....	....	—	....	....
++	++	++	+	....	++	++	+	....	1	....	....
++	++	+	+	....	1	1	....	....	—+	—+	....
++	++	++	++	+1	+1	+	....	....	+1	+1	....
++	++	—+	—+	....	++	++	—+	....	—+	—+	....
++	—+	....	....	....	++	—	....	....	+1	—+	....
++	++	++	....	....	++	++	++	1	1	....	....

eously, the same cultures being used throughout.
indicated by the tables. The interaction of typical and atypical cultures does not bear out the classi-
pneumococci 2, 66 and 72 differ constantly from each other, and yet correspond with several of the

the existence of agglutinins common to this culture and several other strains of pneumococci, as well

The ability of the pneumococcus mucosus group to produce common agglutinins for some pneumococci, and the fact that the streptococcus failed to affect through absorption their agglutinins, would indicate a closer relation of this variety to the pneumocci than to the streptococci.

Conclusions.

I.—Pneumococci by reason of their agglutinating properties exhibit a tendency to separate into numerous groups similar to streptococci.

II.—The pneumococcus mucosus forms a distinct and consistent variety. The production by it of common agglutinins for some strains of pneumococci would seem to indicate a relationship between the two classes of organisms.

III.—The agglutinating substances in the serum of immunized animals were demonstrated by absorption tests to consist of specific and group agglutinins in cases where the agglutinins were sufficiently developed to make use of this method.

IV.—The pneumococci seem to show marked differences in their ability to undergo agglutination.

V.—There was considerable uniformity of reaction of the various strains in low dilutions, but this uniformity is not continued as the animal becomes more highly immunized.

VI.—At present a definite relation between the agglutination reaction and other characteristics of the pneumococci is not established excepting in the case of the pneumococcus mucosus.

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THE ADDITION OF CALCIUM SALTS TO NUTRIENT BROTH. A RELIABLE AND CONVENIENT METHOD FOR GROWING THE PNEUMOCOCCUS, MENINGOCOCCUS, AND CERTAIN OTHER BACTERIA.*

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During the course of some work on the pneumococcus carried on at the research laboratory the need was felt for a culture medium which did not contain any animal body fluids (ascitic fluid, blood serum, etc.). Plain broth was found almost worthless for the pneumococcus, for while one or two generations might grow if planted for blood agar, the growth soon died out, making continued transplantations from broth to broth impossible. Nor did careful neutralization of the broth to phenolphthalein nor even slight alkalization yield any better results. The addition of glucose, as is well known, does cause a luxuriant growth of the pneumococcus, but the production of acid in this case is so great that the cultures die very quickly and therefore need transplantation every few days. The writer felt that it might be possible to neutralize most of this acid as it was produced and thus obtain a broth possessing all of the advantages of glucose broth without its disadvantages. For this purpose calcium carbonate was employed, at first in the form of powder and later, because of several advantages, in the form of pieces of marble.

A number of strains of pneumococcus were subjected to a critical comparative test in a series of about twenty different culture media. On transplanting the cultures every day or two it was soon found that certain of the media, although they yielded a profuse growth, were unreliable; *i. e.*, a growth was not always obtained with each inoculation, even though the culture was still alive. In order to carry such a culture on it was often necessary to reinoculate from the same culture, using, however, a larger amount. Among these unreliable media were glucose broth and glucose broth plus calcium carbonate. Curiously enough *plain broth with marble, but without glucose,* yielded a moderate growth unfailingly with each transplantation.

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On testing the acidity of the cultures in the various media it was found that large quantities of acid were developed in media containing glucose alone, or glucose and calcium carbonate, while small quantities of acid developed in ascitic broth or even in plain diluted ascitic fluid. The cultures in plain broth plus marble on the other hand were usually neutral, though a very small development of acid was now and then observed.

When plain broth is inoculated from an ascitic broth culture of pneumococcus, there frequently is not only no increase in organisms, but an actual decrease. When marble is present there is a growth right from the start. This fact cannot be reconciled with the assumption that the marble acts only by neutralizing acids formed. On reviewing these data Dr. Park suggested that the virtue of the marble might reside in the calcium and not merely in its neutralizing power. Two other salts of calcium, the chloride and the sulphate, were therefore tested. The former was used in solution, one part to two thousand of broth, the latter was used in pieces like the marble already mentioned. My experiments with these two salts indicate that *it is the calcium element, in part at least, which favors the growth of the pneumococcus.* Calcium carbonate (marble) and calcium sulphate (gypsum) are ordinarily regarded as insoluble in water. Nevertheless, a small trace of calcium must pass into solution in order to account for this effect on the growth of the pneumococcus. Since marble also serves to neutralize some of the acid formed, it would seem preferable to the other salts of calcium. Further experiments, however, are necessary to determine this point.

As already stated pneumococcus cultures in media containing glucose die off very quickly. It was not found that the viability of such cultures was increased by the presence of the marble. This is not surprising, for our titrations showed that the marble failed to neutralize considerable quantities of acid. On the other hand, in plain broth plus calcium carbonate (marble broth) the cultures lived just about as long as those in ascitic broth. Out of three different strains tested, one was still alive at the end of thirty days. Out of four, three were still alive at the end of seventeen days.

A point of considerable importance is the effect produced by continued growth in a medium on the virulence of the organism. The cultures tested for this purpose had been grown for fourteen consecutive generations in marble broth. None of them seemed to have lost any virulence when compared with an ascitic broth culture made directly from the blood agar stock cultures.

A peculiarity of the marble broth cultures observed several times was the formation of short chains, while a control culture in ascitic broth showed only two's. Besides this, the absence of anything indicative of a capsule makes this medium a poor one for bringing out the characteristic morphology of the pneumococcus. On the other hand, cultures of the so called *streptococcus mucosus capsulatus* when grown in this medium take on a form practically the same as that of an ordinary pneumococcus.

In preparing this medium, marble is broken up into small pieces in an iron mortar. The finer pieces are removed by screening through an ordinary wire crate. The others, about the size of small dice, are washed in water and one or two pieces placed into each tube. The tubes are then filled in the usual way with plain broth and sterilized in the autoclave.

From the foregoing it will be seen that marble broth is an extremely reliable medium for the pneumococcus, and can in very many cases replace ascitic broth. Its use obviates not only the tedious collection of ascitic fluid, but also the careful fractional pasteurization which ascitic broth requires.

Marble broth can be used also for cultures of the meningococcus. The medium does not produce quite so luxuriant a growth as ascitic broth, but seems to be very reliable.

THE COMMUNICABILITY OF CEREBRO-SPINAL MENINGITIS AND THE PROBABLE SOURCE OF CONTAGION.

PART OF AN INVESTIGATION OF CEREBRO-SPINAL MENINGITIS CARRIED OUT UNDER THE AUSPICES OF THE SPECIAL COMMISSION OF THE DEPARTMENT OF HEALTH OF NEW YORK CITY.*

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Epidemic cerebro-spinal meningitis, so far as history is concerned, seems not to have been clearly observed prior to 1800. In the histories of the great epidemics of Europe, from the thirteenth century on, symptoms are described which almost certainly point to this disease. An interesting account of these early epidemics is given by Webber[1]. Since 1800 the disease has appeared in four large epidemic periods. Hirsch[2] divides these periods as follows: the first, from 1905 to 1830, shows the disease more general in the United States, though there are also isolated epidemics in various places in Europe. In the second period, from 1837 to 1850, meningitis became prevalent in widespread epidemics in France, Italy, Algeria, the United States and Denmark. During the third period, from 1854 to 1875, the malady reached its widest diffusion throughout most of Europe, the adjoining countries of nearer Asia, the United States and some parts of Africa and South America. The fourth period, from 1876 to the present time, is a return to merely casual epidemic outbreaks or to more or less considerable groups of cases here and there within its former limits. It is to be noted, however, that during this period there is not a year wholly free from epidemics in some part of the world.

These four periods have been critically examined by Jaeger,[3] who calls attention to the fact that the interval between the periods is growing shorter thus—seven, four and one year respectively—and that as our knowledge of the disease is becoming more definite and the cases are more carefully reported, one finds that epidemics of this disease have never entirely died out. Since the spontaneous origin of living disease

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germs is out of the question, Jaeger believes that such long intervals as that of seven years between the first and second period can only be explained "either by assuming that the virus has extraordinary powers of life outside the body, or that the virus is kept alive by being transmitted from one individual to another *without giving rise to epidemics.*" The former possibility may be dismissed, for practically all authorities agree that the organism certainly does not possess very great powers of resistance. In fact, most authorities have found it to possess but little vitality. We must, therefore, look upon the sporadic cases as some of the connecting links between the epidemics and must also seek for the organism in individuals who are not infected.

Geographical and Seasonal Distribution—A careful study of the geographical distribution shows that the disease occurs mostly in the north temperate zone, although it has been observed as high north as Iceland and as far south as Java. Of 182 European epidemics, 24 were in October and November, 46 in May, 24 in June and July, 10 in August and September. In Sweden, of 417 local outbreaks, 311 were in winter and 106 in summer.[4] Of 85 epidemics in the United States, 37 occurred in winter, 18 in winter and spring, and 23 in spring.[2] The disease has occurred in perfectly mild winters, such as those at Metz in 1839-40, in Italy in 1839-40 and 1840-41 in Indiana in 1862-63 and in Kentucky in 1866. Some epidemics in fact have not shown themselves until summer, as at Bordeaux in 1839, Toulouse in 1842, Dublin in 1850 and Cracow in 1874. When meningitis was epidemic in Asia Minor in 1868-70 it came to an end in Magnesia just when severe cold set in; but it showed itself at Smyrna in the spring under very high temperature.

Etiology—It is now generally conceded that the etiological factor in most of the cases of epidemic cerebro-spinal meningitis is the diplococcus described by Weichselbaum[5] in 1887, and now commonly called the meningococcus Marchal[6] analyzed 513 cases of cerebro-spinal meningitis. He divides the cases into primary sporadic and epidemic cases. In the former there were 95 cases, of which 48 showed the meningococcus, 40 the pneumococcus, and 7 various other organisms. Among the second class of cases, 418 in number, 307 (73 per cent.) were associated with the meningococcus, 67 (16 per cent.) with the pneumococcus, and 44 (10 per cent.) with various other bacteria.

Schottmuller[7] examined 49 cases, finding the meningococcus of Weichselbaum 43 times. In three of the cases there was mixed infection, once with tubercle bacillus, once with pneumococcus and once with *streptococcus mucosus.*

In the literature of meningitis, especially shortly after the discovery of the organism and before bacteriological diagnosis had been very much developed, a number of instances are recorded in which epidemics of cerebro-spinal meningitis were observed in which the infecting micro-organism was other than the meningococcus. Some of these appear to have been epidemics of pneumococcus meningitis (Panienski,[8] Quadu,[9] Weichselbaum, cited in Schottmüller[7]). In others the statements of the authors are so conflicting that one hesitates to accept them (Bonome[10]). It must always be remembered that cases of pneumococcus and of streptococcus meningitis are fairly common, and that they will, naturally, occur also during an epidemic of meningococcus meningitis.

As said above, however, there is no doubt that the large majority of cases of epidemic cerebro-spinal meningitis are associated with the meningococcus.

In an excellent study of 119 cases of cerebro-spinal meningtis which occurred in Boston Councilman[11] says that " in a question of the probability of transmission of an infectious disease and the ways in which the organism causing it can pass from the lesions of the disease to the outside; further, the viability of the organisms and the possibility of their leading a saprophytic existence."

Occurrence of the Meningococcus—It is unnecessary here to go into the occurrence of the meningococcus in the meningeal exudate and in the fluid obtained by lumbar puncture. So far as the epidemiology of the disease is concerned, this localization of the organism in the interior of the skull and spinal canal is without special interest.

Councilman found Gram-negative diplococci in the nasal secretion of a number of patients suffering from meningitis. These organisms were not, however, isolated in pure culture and further identified. The same author isolated one culture from the tonsils of a patient with cerebro-spinal meningitis, and this proved to be a true meningococcus. Schiff[12] examined the nasal secretion of 27 healthy persons, finding an

intracellular diplococcus in 7. Of these 7, 3 were identified as meningococci by Weichselbaum. Kiefer,[13] while working with a culture of meningococcus, was seized with a coryza. He thereupon succeeded in isolating a meningococcus from his nasal secretion. Lord[14] also demonstrated the organism in the nasal secretion of a patient which he examined. Albrecht and Ghon[15] isolated the meningococcus from the nasal secretion of a patient with cerebro-spinal meningitis and from that of a person in contact with such a patient. Weichselbaum and Ghon[16] isolated the organism from the nasal secretion of one patient with cerebro-spinal meningitis and from that of three persons in contact with cerebro-spinal meningitis. Griffon and Gandy[17] succeeded in isolating the meningococcus twice from one patient with cerebro-spinal meningitis, an interval of five days elapsing between the two times. Our own results along these lines will be found at the end of this paper.

A number of observers have succeeded in isolating the meningococcus from the blood by means of cultures (Solomon,[18] Moller,[19] Bettencourt and França,[20] Elser[21]). The last-named author examined 41 cases and succeeded in isolating the meningococcus from blood cultures in ten. He found that the occurrence of the organism in the blood was extremely irregular; sometimes the organism was present at the beginning of the illness; sometimes at the end. He found no relation between the presence of the organism in the blood and the severity of the disease.

Weichselbaum has recently published a case in which the meningococcus was found in the lesions of an ulcerative endocarditis. Drigalski,[51] in one case, found it in the herpetic vesicles.

The above are practically all the observations on the occurrence of the meningococcus elsewhere than in the meninges of the brain and cord. An observation on the occurrence of the meningococcus in the dust of infected barracks can be dismissed as absolutely unreliable.

Viability of the Meningococcus—There are but few statements as to the viability of the meningococcus. Jaeger[22] states that he observed that some meningococci which had been dried in pus were still viable after 127 days. On the other hand, Councilman says that so far as he was able to tell from its behavior in culture media and in the

tissues, "the meningococcus has a feeble vitality and would not be capable of leading a saprophytic existence. It must of course be remembered that in experiments to determine this viability, we cannot reproduce artificially all the conditions which the organisms find in nature." Bettencourt and França[20] made a number of experiments with cultures of meningococci. It was found that cultures dried on glass at various temperatures, 37 degrees, 20 degrees, 19 degrees C., had lost their vitality at the end of twenty-four hours. In many cases they were already dead at the end of three hours. Cultures exposed to direct sunlight where the thermometer registered 35 degrees to 37 degrees C. were dead at the end of two hours. Weichselbaum[23] also regards the meningococcus as having but feeble powers of resistance, and this opinion is shared by almost all the best workers.

Transmission of the Disease—Influence of Close Contact—That infection goes hand-in-hand with close contact between persons is shown, for example, by the following references: Frothingham[24] describes a small epidemic which broke out in *one* regiment of the Army of the Potomac. The soil was clay, weather mild and damp. The soldiers were crowded together, five to six men in a small tent. Conditions were such that remittent, intermittent and typhoid fever abounded. Nevertheless the cases of meningitis observed occurred only in *one* regiment, and this had by no means the worst quarters. Gifford[25] reports five cases of meningitis occurring in one family, one after another, within a week. He was unable to trace the cause of the outbreak. Hammer[26] in a discussion, remarked that in 1843 he had seen an epidemic in Mannheim, Germany. The garrison there consisted of 800 men, and the city contained 30,000 people. Yet no one was affected excepting the military. In two months about 50 cases had occurred, of which 11 were fatal. A few years previously a similar epidemic occurred in Strasbourg, also confined to the barracks. Corbin[27] describes an epidemic among the soldiers at Orleans in 1847-48. The townspeople were not affected. Jourdes[28] says the disease raged among the troops in Strasbourg for four months before it broke out among the townspeople. Here it occurred in 52 streets, but raged particularly in narrow, crooked streets where many people were crowded together. Mayne[29] observed epidemics which occurred in various workhouses

and hospitals. Gahlberg[30] remarks that certain streets are markedly affected. In one street there were 9 cases, in another four and in a third 6 cases. Those in the last-mentioned street were practically in neighboring houses. Most of his patients were robust. The cases extended from February to May. Ziemssen[31] believes that conditions of soil are without any influence on the spread of the disease, and that the weather is also no factor. In general his cases belonged to those living in unhygienic surroundings. Only 5 (out of 42) belonged to the upper class. Most of the rest lived in poorly ventilated, damp dwellings and on the ground floor. But these conditions he says had existed a long time prior to the epidemic and can therefore be regarded only as auxiliary factors. Twice a house infection was observed; in one instance, to be sure, confined to two sisters. The other embraced four persons, who became sick in the course of two weeks. Three of these died. Jaeger[3] says that an important factor in the spread of the disease is the rapid accumulation of people in cities and towns and a development of sanitary conditions of the dwellings which does not keep pace with this accumulation.

In the present epidemic in New York City both last year and this, the disease has affected chiefly the people living in the densely populated sections, the lower East Side, or " Ghetto," the lower West Side, and the " Little Italy " section in the vicinity of One Hundred and Tenth street and East river.

Influence of Age—So far as the influence of age on the prevalence of infection is concerned, the following statistics may be of interest. Hirsch[2] has collected the histories of 1,267 fatal cases occurring in Sweden from 1855 to 1860. Of these, 889 patients were under fifteen years, 328 between sixteen and forty years, and only 50 were over forty. In an epidemic in Bromberg, Germany, of 141 cases, 132 were between two and seven. In an epidemic in Thuringia, out of 180 cases, 160 were under twenty years. Leaving out of account the epidemics among soldiers, epidemics have also been reported in which the cases were mostly in persons between twenty and thirty years of age. Such was the case, for example, in the Italian epidemics in the forties, and in the epidemic in Montgomery, Alabama. In the latter, of 84 patients, 10 were under ten years of age; 23 between ten and twenty; 27 be-

tween twenty and thirty; 13 between thirty and forty; 12 over forty years of age.

In an epidemic of cerebro-spinal meningitis in Dantzig, Germany, there were 779 deaths. Of these, more than 25% were of children under one year; 88 per cent. were under ten years. In the epidemic in Cologne in 1885-1892 the majority of patients were between fifteen and twenty-five years.

We see from this that the disease at one time affects mostly infants, at other times older children, and at still other times adults. What the reason for this is does not seem at all clear.

Other Predisposing Factors—A number of writers lay stress on slight trauma as a predisposing cause and state that in many cases a history could be obtained of some injury to the head shortly before the onset of the disease. In our series of cases it was the exception to obtain such a history, although inquiries were always made. When it is remembered that children are constantly receiving all sorts of knocks it will not be surprising if now and then the disease will be found to have been preceded by some slight trauma. But that this is of any influence in determining the infection has nowhere been proved.

Some of the writers on meningitis mention the occurrence of a coryza or a sore throat just before the onset of the disease (Berdach[32]).

Influence of Overexertion—Huebner[33] says that one of the factors predisposing to the disease is marked bodily, and perhaps, also, mental exertion. This was shown particularly in the military epidemics in France, where it was found that raw recruits unused to hard service were especially susceptible. That the latter statement, at least, is correct seems borne out by statistics from other sources. In the epidemics among the Wurtemburg troops in 1898, Jaeger[3] found that out of 56 cases, 43 were among the troops of the first year of service, 11 of the second year, and 2 of the third year. But this does not show that it is due to overexertion. If that were the case we should expect far more cases in war than in times of peace, and yet, as we know, cerebro-spinal meningitis is not a disease of war. Jaeger also points out that the physical exertion required of the soldiers is carefully graded so that the recruits are only gradually put to hard work.

Virulence of the Meningococcus—It is possible that a given strain of meningococcus can in some way acquire an increased virulence and so start an epidemic. Since, however, this organism is so slightly virulent for ordinary test animals, we have no way of determining this except by studying the development of the various epidemics.

Studies on Animals—In the study of cerebro-spinal meningitis animal experiments have yielded practically no results of any importance owing to the fact that most animals are so little susceptible. Mice seem most so, but even these animals must be inoculated intraperitoneally; subcutaneous injections are usually without results. Guinea pigs are also somewhat susceptible, but not to as high a degree as mice. (Weichselbaum,[23] Bettencourt and França[20]). Bettencourt and França injected three monkeys with cultures of meningococcus, one by trephining and two by spinal inoculation. They also rubbed a culture on a cotton swab on the nasal mucous membrane of a fourth monkey. None of these methods was followed by infection. Five goats were trephined and inoculated subdurally without effect excepting a slight fever. One goat was inoculated into the frontal sinus and another into the spinal canal, but without effect.

After irritating the nasal mucous membrane by means of ammonia we rubbed cultures of meningococci into the noses of several very young puppies, but did not succeed in producing an infection.

On the whole, practically all reliable authorities report negative results with animal tests.

Cerebro-spinal Meningitis in Other Animals—There are but scanty references to the simultaneous occurrence of cerebro-spinal meningitis among domestic animals and household pets. Magail[34] observed an epidemic of cerebro-spinal meningitis in Donera, Africa, in 1845, similar to one he had seen in France in 1837-42. The cases occurred suddenly among the soldiers in February. No cause could be found, but it was remarked that an epizootic had broken out among the barnyard fowl two weeks previously and raged among them for two months. Albrecht and Ghon[15] in discussing this point say that the cerebro-spinal meningitis of horses has been said to be due to the meningococcus. The disease among horses (the so-called Borna'sche Krankheit) was very frequently observed in Saxony in 1894-96. Yet no cerebro-spinal menin-

gitis was observed among the people at that time. They think the causative agent of this disease to be entirely distinct from the meningococcus. The same view is held by Siedamgrotzky and Schlegel,[35] and by Johne.[36]

We have made numerous inquiries among the veterinarians and stablemen in New York City regarding the presence of cerebro-spinal meningitis among horses. The answer has almost invariably been that no cases of the diseases have been observed for years. Two cases were mentioned as having occurred early in the season. One veterinarian, to be sure, stated that some three years ago he saw about 150 cases of the disease among some 8,000 horses belonging to a street railway company of this city. The statement could not be verified and may probably be dismissed as unreliable.

Insects as Carriers of the Disease—It has been suggested that the disease is carried from individual to individual by means of vermin or insects. So far as the writers have been able to discover, the literature contains no reference to this side of the subject; the indirect evidence appears to negative the assumption. This evidence consists in the geographical distribution of the disease, local distribution, season, class of people affected, etc. So far as the geographical distribution is concerned, we have already seen that this is very extensive. Locally, the disease has occurred in high and dry regions and in low, marshy ones; near the coast and far in the interior. The older observers were quite unanimous in believing that conditions of the soil and atmosphere were without influence on the development of the disease (Ziemssen[31]). Although the disease has in general been observed usually among the laboring classes, especially where the people were crowded together, it has often been observed to attack people in the best surroundings. Out of 42 cases reported by Ziemssen, 5 belonged to the upper classes. Holbrook[37] says that the cases observed occurred in the best and in the worst homes. Some patients were tenderly cared for, others neglected. They were equally affective.

The vermin theory of infection also presupposes the presence of the meningococcus in the peripheral blood of the patients. Although, to be sure, the meningococcus is frequently found therein, its presence does not appear to be at all constant throughout the disease (Elser[38]). Even when present it does not appear to be so abundant that fleas or bedbugs

would be likely to ingest one very often. The length of time which sometimes elapses between primary and secondary cases of cerebro-spinal meningitis seems also to argue against this mode of infection. So far as mosquitoes are concerned, it will suffice to say that the disease is prevalent in this country at a season when there are practically no mosquitoes. It would be difficult, if not impossible, to reconcile all these facts with the assumption that an insect or parasite is liable to transport the disease.

Immunity and Susceptibility—So far as immunity is concerned, there is but little literature. North[39] gives one undoubted case in which there had been an attack twenty-five months previously. Another patient had the disease in August, 1808, and again in May, 1810. Herman and Kober[40] report a girl who had the disease in May, 1886, and died in the second epidemic the following year. Numerous instances are recorded in which several members of one family were affected. Friis[41] observed house and family epidemics which affected two to five persons. Singer[42] reports eight deaths in one family. Baxa[43] observed four cases in one house, three in another and two in a third. Brookes[44] also reports eight cases in the different branches of one family, in another there were five, and in still another family, four cases. Ziemssen[31] reports the case of two sisters who were affected. Gifford[25] reports five cases in one family, one after another within a week.

In the series of cases studied by us, in two instances the disease had occurred in the same family a year ago (cases 19 and 52). It is possible that cases 11, 13, 37 and 54 may also be instances of special susceptibility, for in these all the children of the family developed the disease. The same may apply to case 54, in which four out of five children were attacked. The presence of a special susceptibility is perhaps also indicated by the fact that in most of the families investigated, only one or two children out of several were affected. On analyzing the histories of 45 families in which a number of children is noted, we find that these families had a total of 210 children. Of these 210, 63 became infected, while 147, who were probably equally exposed to infection, escaped. Since our own investigations have shown that many healthy persons in contact with cases of cerebro-spinal meningitis may harbor meningococci in their noses, it would appear that these persons were more or

less immune to such infection. This immunity, of course, can be conceived as being either local (nose or meninges) or general.

Communicability—There seems no doubt among the majority of observers as to the transportability of the disease, but there is no unanimity as to how this is effected. W. H. Draper[45] observed an epidemic in Carbondale, Pa. He found that the disease had begun in two places; 1st, where there had been a camp of soldiers, and 2d, where some tramps had carried away things belonging to dead soldiers. Hirsch[2] expresses himself as follows: "Connecting with the infective nature of epidemic meningitis is the question of its communicability or contagiousness. Most observers have answered it quite decidedly in the negative on the ground of their experience, that those who have come into close and continuous contact with the sick, such as medical attendants and nurses, have been very rarely attacked, and that patients suffering from it had been admitted into the wards of hospitals without any extension of the disease to the other patients ever taking place. On the other side, there are facts that tell in favor of communicability, the most notable of these being the observations made in the epidemic of 1837-40. In these epidemic the disease would seem to have been transported by infected troops from place to place, sometimes even to distant garrisons, where it did not confine itself to the division of troops originally, but spread in epidemic form to several other regiments. Baudin[46] thinks the disease contagious and has collected the following interesting points:

In 1841 a battalion of troops marched from Pont Saint Esprit, where the disease raged, to Marseilles, which was not yet infected. Shortly afterward two other battalions of the same regiment returned from Algiers and were distributed among the barracks with the first battalion. A little later a case of meningitis broke out among the second battalion.

In 1847 a division of troops, who had suffered much from meningitis at Avignon, was sent to Nimes. No further cases occurred here among them. But some healthy troops which had arrived from Africa also arrived at Nimes, and among these, cases of meningitis broke out soon afterward.

In Orleans it was twice observed that soldiers sleeping next one another were affected. The two cases outside of the garrison were the mistress of one of the soldiers and her child. In St. Etienne, in

1840, two soldiers who shared one bed were taken sick, one within forty-eight hours of the other. In one of the barracks a soldier returning from guard duty lay down in a bed from which another who had been taken ill with meningitis had just been removed. The second soldier became infected and died. In Aignes-Mortes, out of the people living in one house five were affected, of whom four died. In Strasbourg, among others, there were affected two surgeons, one clinician, five military nurses, seven children of soldiers and several workmen employed about the barracks.

While the disease raged in Strasbourg a regiment from there was sent to Schledtstadt on January 21, 1841. On the twenty-ninth of that month the first case appeared in that town, the child of an innkeeper near the barracks, the inn being much frequented by the soldiers. On February 6, two children, the daughters of the butcher supplying the garrison with meat, were affected. Hirsch[2] describes a remarkable outbreak in Algiers in 1840, a season when the disease was more than usually prevalent among the troops in France. Algiers is the only spot on African soil where the malady has ever been seen; it is in intimate relations with France, and importation of the disease is made all the more credible by the fact that its first appearance there was among the French troops, with subsequent extension to the civil residents. Horner[47] suggests that in the epidemic in the hospitals of Washington, D. C., in 1864-5 the disease had been introduced from the seat of the war. Broussais[48] has come to quite different conclusions regarding the spread of the disease. He says that the epidemic affected chiefly the military. It began at two points in France in 1837, namely, Bayonne and Narbonne. From these it spread in somewhat radiate fashion. The disease did not seem to be due to a transportation of the virus through the marching regiments, for the disease crossed the Italian frontier and raged in Italy in 1840-41. In no instance could direct contagion be demonstrated. Out of 1,041 cases there were 592 deaths (1:1.75). Brooks[44] investigated the history of 112 cases and says: "So far as contagiousness is concerned, the answer from the different reporters was universally 'No.'" The only evidence that supported the theory was that in a few instances more than one case occurred in the same family. The evidence becomes less valuable,

however, when we find that these cases occurred almost simultaneously with each other, or were so far separated as not to show any relationship with each other. One of the very best studies on the spread of the disease was made by Peterson,[49] who investigated the histories of the cases occurring in Berlin in 1895-6. By extremely careful work he was able to connect a series of 23 cases one with another, thus showing a high degree of communicability of the disease.

Original Investigations—The clinical data on which this study is based were limited to cases occurring two or more in one house in the period from January 1, 1905, to June 1, 1905. This limitation was maintained because it was felt that their careful analysis would be more apt to throw light on the mode of transmission than would an analysis of the other cases.

The bacteriological study, on the other hand, while it included some of the cases of the clinical series, sought especially to obtain data on the occurrence of the meningococcus in the nose. For this reason it embraced an extensive series of individuals, including not only cases of cerebro-spinal meningitis, but also persons apparently perfectly well.

Clinical Study—The record of cases of cerebro-spinal meningitis, which is under the direction of Dr. Billings, is kept on the card catalogue system and arranged by streets and numbers. It is therefore a comparatively easy matter to run over the cards and note the names and addresses where several cases have been reported from one house. The cards from January 1st to June 1st numbered just about 1,500, and among these, 88 instances (representing 200 cases) of multiple cases were discovered. Lack of time prevented the investigation of all these 88 instances, but the following results, obtained by a careful study of 58 instances, would in all probability apply to the remainder.

1. At 488 Eleventh avenue, Johnny, ten years old, died in March, after an illness of one week. He was not sent to the hospital. On May 2, his brother, Tommy C., aged eight years, developed the disease, dying on the following day. There are three other children in the family. Besides these cases the disease appeared in *another family* in this house. Ed. M., five years old, was sick from March 17, about one week after J.'s onset. There are two other children in the M. home.

No further contact can be discovered except that the children played together in the street.

2. Michael K., two years old, of 64 Amsterdam avenue, became ill with cerebro-spinal meningitis April 24, and died May 8. He was not taken to a hospital. On May 3 his little sister Agnes, aged four years, became ill with the disease. She has since recovered. There are three other children in the home. Agnes did not sleep with Michael.

3. Nellie L., aged three years, of 317 East Thirty-eighth street, became ill with cerebro-spinal meningitis on March 25. Two days later, Mary, aged eleven years, developed the disease and died in five days. Nellie recovered. There are six children in the family, which occupies four rooms. There was another case of cerebro-spinal meningitis in the house (but the people have moved and it is impossible to get data about it). It was reported April 27 and was a child one year old.

4. Celia M., in 425 West Thirty-first street, 9½ years old, was taken ill with cerebro-spinal meningitis on March 3, and died March 4. Five other children at the time, the family living in four rooms. Previous to the illness all these children slept in one bed. On April 5 one of these developed the disease and died April 6. There are no cats or dogs. There may be bugs.

5. Michele T., aged five years, of 161 West Twenty-seventh street, died of cerebro-spinal meningitis on April 1, after an illness of twenty-four hours. There were five other children, the family living in two rooms on the fourth floor. On April 19, R. F., aged 11½ years, living on the second floor, developed the disease and was taken to Bellevue the same day. There is very much intimate intercourse between these two families, children going into each other's homes all the time. The F. family also have two rooms, fairly clean. Two other children still left. These were not affected.

6. Katy S., aged sixteen months, living at 347 East Seventy-third street, died of cerebro-spinal meningitis on March 22, after an illness of one day. There is one other child. Among those who came to the funeral was Mr. P., living on the same floor. None of the P. children or Mrs. P. attended. Peter P., aged three, developed the disease and died on March 30. There are three other children in the family, which lives in three rooms; mother and father go out to work, the smaller

children being taken care of by a family across the street. Interval between cases, six days. There is another case of cerebro-spinal meningitis on the ground floor of the same house. Mary S., aged thirteen years, the daughter of a small shopkeeper (furniture), was taken ill February 16; she died March 19. Typical history. Two other children, ten and twelve years. No direct contact can be discovered between this family and either of the preceding.

7. Elizabeth S., 402 East Sixty-fifth street, 2½ years old, suddenly developed cerebro-spinal meningitis on the night of March 29. The child did not play out in the street with other children, but was taken out daily by her mother. The day preceding her illness she had played on the roof in some sand. Her mother was hanging out the wash. Playing in the same heap of sand was a Johanna St., age 3½ years, living in the same house (model tenement). Johanna was taken sick two days after Elizabeth and died April 8. The St.'s keep one dog. Both families have excellent clean apartments, plenty of light and air.

8. At —— Hospital a chronic rheumatic who had not been outside the hospital for many months suddenly developed cerebro-spinal meningitis. Three weeks before this there had been two cases of the disease on the same hall. All of the patients, including the rheumatic, had private rooms. Connection between these cases is apparently through the nurse, he having attended all three cases.

9. Bartholomew M., age twenty-three years, died of cerebro-spinal meningitis on January 31 after an illness of two days. He was removed to the hospital the day he was taken sick. The young man boarded with Mrs. Hart, the housekeeper of the building. This woman sweeps and cleans the halls, etc., daily, and sets out the ashes, but does not come in contact with the tenants any more than an agent collecting the rents. On March 20, Bridget L., aged twenty-one years, one of the tenants living on the next floor above, developed the disease. She has since recovered. There are two children in the L. family; none in the H. No cats in either home.

10. Joe F., aged four years, of 593 Greenwich street, rear house, was taken sick with cerebro-spinal meningitis on March 7 and died March 9. The family consists of the parents and two other children. They occupy two rooms. On March 11, John C., aged five years, a

playmate of Joe F., developed the disease and died March 14. Two other children in the family. Two rooms. Filthy; no cats. Joe's most intimate chum was another boy named Buster. This boy, however, was not attacked by the disease.

11. Isaac C., 174 Clinton street, aged ten years, developed cerebro-spinal meningitis about three months ago on a Saturday afternoon. That same evening his brother Moe, aged four years, developed the disease, dying within twenty-four hours. On Monday two others. Thereupon all three were sent to Gouverneur Hospital, where they finally recovered. When Isaac and Moe became sick on Saturday, the parents sent Louis and Philip out of the house to some relatives on Sunday. Nevertheless they developed the disease in the latter's house the next day. In this house these two children slept together with the other children in that family. None of the latter, however, were affected.

12. Joe N., at 142 Tenth avenue, aged three years, died of cerebro-spinal meningitis about April 7, after an illness of a few days. One month later May H., aged three years, living on the next floor above, developed the disease. The N.'s have one other child; H.'s have four other children. The children of both families play together, but otherwise there is no intimate relation between the two families. Meningococci were isolated from the nose of Joe on the second day of the disease.

13. Laura G., at 458 Eleventh avenue, 3½ years old, and James G., five years old, developed cerebro-spinal meningitis the same day, May 19. Laura died the following day, James was sent to Bellevue Hospital. On May 24, Richard, six years old, developed the disease. There are no other children. They all slept together. Four rooms, rather dirty, very dark.

14. Rosie S., aged nine years, at 172 Rivington street, developed cerebro-spinal meningitis April 18, and died April 23. A week after her death, Joe, her brother, aged five years, developed the disease. He is now convalescent at Gouverneur Hospital. There are three other children in the family, which occupies three rooms. Meningococci were isolated from the nose of Joe on the fifth day of the disease.

15. Louis M., at 233 East Ninety-seventh street, aged nine weeks, died of cerebro-spinal meningitis after an illness of one week. He was kept at home during the illness. His sister Molly also developed the disease. After remaining at home for eight days she was sent to the Presbyterian Hospital, where she died after a total illness of about one month. Prior to her removal to the hospital, and while she was already sick with cerebro-spinal meningitis, Molly was allowed to sleep with the other children. Nine days after this removal to the hospital, another sister, Cecilia, aged fourteen years, developed the disease. She was also sent to the hospital and is now convalescent. Beside the above there are three other children in the family. The rooms are fairly clean; there is one cat; also rats and mice.

16. Rachel K., at 107 Forsyth street, top floor, aged seven years, developed cerebro-spinal meningitis about March 3, and died in three weeks at Beth Israel Hospital. She was at home four days before her removal there. The family occupies five rooms fairly clean. There are four other children. About one month later Elizabeth E., one year old, living on the same floor of this house, developed the disease. She died May 6; there are four other children in this family. There is considerable friendly intercourse, especially between the children of the two families. No cats in either home.

17. Willie S., twelve years old, of 117 Norfolk street, developed cerebro-spinal meningitis February 22, and was sent to the hospital three days later. He is now well, but not yet out of the hospital. There are seven other children, and they live with their parents in three rooms. On May 15 Lena H., aged eight years, developed the disease, and died May 16. There are five other children in the H. family. There is considerable intercourse between the children of these families, and some of them are in the same class in school.

18. Esther W., aged ten years, of 96 St. Mark's place, felt sick with headache May 15, and became violently ill of cerebro-spinal meningitis on the morning of May 16. On the night of May 16 her playmate, Bella, aged 6½ years, developed the disease and was taken to the hospital the next day. There are several other children in each family. Beside contact through the children, it was found that Mrs. F. visited the W. child the morning she was sick in bed, May 16.

19. Esther S., then living at 19 Allen street, had cerebro-spinal meningitis from June 1, 1904, and died in about two weeks. Her sister, Rebecca, developed the disease about June 11, 1904, and was taken to Gouverneur Hospital June 12. Discharged cured September 14. 1904. Since then the family has moved several times. They now reside at 4 First avenue. On May 19, 1905, Theresa S., aged four years, developed the disease and is now in Gouverneur Hospital. There are now four other children at home. Three rooms, clean and light.

20. Sarah G., at 118 Delancey street, seven years old, developed the disease on January 13, and died January 22. Two weeks after her death her sister Rachel, eleven years old, developed the disease. She is still sick. The family have one other child beside these. They occupy two rooms, quite dirty. No dogs or cats.

21*a*. Louis Z., seven years old, of 85 Willet street, third floor front, became ill with cerebro-spinal meningitis April 30, and was taken to Gouverneur Hospital the same day. Both he and his brother and sisters (ranging in age from one to eight years) often played with the children of a family, C., living on the floor below. On May 20 the disease broke out in the C. family (see next case). Meningococci were isolated from Louis Z.'s nose on the third day of the disease.

21*b*. Charles C., of 85 Willet street, aged nine years, developed cerebro-spinal meningitis on May 20, and was taken to Gouverneur Hospital May 23. On May 22 his little brother, Tobias, four years old, developed the disease. Both are still sick. Beside these two children the C. family has one other small child and several older children who go to work. They occupy three rooms.

22. Jennie D'A., aged 2½ years, of 316 East Eleventh street, second flight, was taken sick with cerebro-spinal meningitis March 2, and died March 3. On March 7, Rosie, aged 3⅓ years, a sister of Jennie, developed the disease and died within twelve hours. The children did not sleep together. No previous case known. Family occupies three rooms and consisted of the parents and six children. There are no bedbugs; rooms clean.

23. Nicholas D., 3½ years old, of 2134 First avenue, taken sick with cerebro-spinal meningitis February 22. On March 1 his brother C., aged four months, who had slept in the same bed with him, de-

veloped the disease and died April 21. There are six other children, mostly older. Family has three rooms, moderately clean. No cats.

24. Camella G., sixteen years old, 2076 First avenue, third flight, was taken sick with cerebro-spinal meningitis March 7, and died May 3. There are three other children in the family. While Camella was sick, among others who came to visit was Mrs. S., who lived on the floor above. On March 28, Maria S., daughter of the latter, developed the disease; she has now completely recovered. In addition to contact through Mrs. S., there was much contact between the other children of both families, who constantly played together.

25. Eddie S., of 1699 Third avenue (eleven years old), had cerebro-spinal meningitis in December and died just before Chirstmas. Among his chums was a boy named C., living across the street (1650 Third avenue). In addition to this, the other C. and S. children were very good friends and visited each other's homes frequently. On February 24, Theresa C. (sister of the C. boy), aged 5½ years, developed the disease and died February 25. On February 25 her sister Kate, 2½ years old, developed cerebro-spinal meningitis and is now in the hospital. On February 27 Maggie, aged seven years, developed the disease. She recovered, but is deaf. There are four children still left. Interval between S. and C. cases, two months. Intervals between the three cases occurring in the C. family were one and two days.

26. Pauline P., of 3 Hester street, aged eleven years had cerebro-spinal meningitis March 18, and died the same day. Besides the parents there are four other children, also one woman with a baby. All these live in three rooms. On the same floor in the front of the house lives a family, F., who are very friendly with the P. family. The children are always in and out of the apartments. On March 23 Mary F. developed the disease and was taken to Gouverneur Hospital next day. She has now recovered. There are three children and the parents in the F. household.

27. Sadie S., at 78 East One Hundred and Thirteenth street, eleven years old, became sick with cerebro-spinal meningitis March 10 (Harlem Hospital, then Bellevue; recovery). Her brother Max also developed the disease twelve hours later. Recovered. Mrs. S. says the girl complained of fever and chilly sensations for two days prior to

onset. She insisted, however, on going to school. During this prodromal stage there were no headaches, no vomiting.

28. Liboria C., ten years, Joan C., eight years, and Ernesto C., seven years, of 431 East One Hundred and Fifteenth street, all developed cerebro-spinal meningitis on the same day about two months ago. Ernesto died. No trace can be found of source of infection.

29. Francesca M., of 195 Elizabeth street, was taken sick with cerebro-spinal meningitis about March 10. She ran a typical course for twenty-two days. About April 5 she had a relapse and was taken to Bellevue April 27. On April 17 Joe M., seven years old, a brother of the preceding, suddenly developed the disease. He had not slept with the patient. The grandmother of the children suddenly became sick with cerebro-spinal meningitis on April 22, and died in Bellevue April 29. She had not slept in the same room with either patient. The family occupied three rooms on the top floor of a dirty tenement. No cats or dogs. Bugs probably present. Meningococci were isolated from the nose of Joe on the twelfth day of the disease and from the nose of the grandmother on the fourth day of the disease.

30. Katy K., five years old, 224 West Sixty-seventh street, died of cerebro-spinal meningitis about five weeks ago after an illness of one week. One week after the onset of the disease, Jennie L., also five years old, and living on the floor below, developed the disease. No direct connection can be made out and no good history obtained. Neither family at home. It is very likely, however, that the children would play together, as they are of the same age.

31. Kitty T., aged three years, of 308 West One Hundred and Thirty-fifth street, died of cerebro-spinal meningitis about one month ago after an illness of three weeks. A week after she was taken sick the baby, Tony, one year old, developed the disease and died in ten days. There are no cats or dogs about; there may be bugs.

32. Francis C., aged two years, of 20 East One Hundred and Thirty-second street, became sick with cerebro-spinal meningitis on February 16 and died two days later. His father, a carpenter by trade, did not feel quite well on February 17 and became very sick on February 18, in the morning. He died February 22. There are two other

children and the mother still living. They have returned to Carbondale, Pa. Family occupied four rooms on top floor, all light; no cats or dogs.

33. Gertrude F., three years old, 124 East One Hundred and Eighteenth street, became sick with cerebro-spinal meningitis March 27, and died within twenty-four hours. Four days after her death her sister Flora, one year old, developed the disease, and died May 12. There are two other children. Flora was taken to the hospital at once. Family occupied four rooms, fairly good condition. Had no pets.

34. Lester G., of 235 East One Hundred and Second street, top floor, aged 2½ years, was taken sick with cerebro-spinal meningitis on March 25, and died May 6. There were three other children in the family, but they did not sleep with patient. The eight-year-old child of the janitress, Mrs. L., living on the ground floor, developed the disease, and died in a few days. There is but little intercourse between the families, and the children do not play together (Mrs. L., has three children). Mrs. L. visited the G. family once at the beginning of the illness. It was about a month, she says, before the illness of her own child. The G. family did keep a cat; there are a few bedbugs; no roaches. No cats or vermin (?) in the other house.

35. Henry W., aged thirteen years, 206 Broome street, was taken ill with cerebro-spinal meningitis suddenly and taken to the hospital next day. Eight days later his brother Aaron, aged six years, developed the disease. Both patients recovered. There are five other children in the house and the family occupies three rooms. There are no bugs (?), but two cats. Interval, eight days.

36. Kathleen S., 115 East One Hundred and Second street, aged sixteen months, was suddenly taken ill with cerebro-spinal meningitis on March 12, and died on March 14. Five weeks later her brother Daniel, 3¼ years, developed the disease, dying two days later. There are no other children in the family. Both patients slept with their parents in one large bed, and they slept there even while sick. Interval between cases, five weeks. There are no cats or dogs and no vermin. The rooms are moderately clean.

37. Baby H., eleven months old, at 208 East Ninety-sixth street, top floor, developed cerebro-spinal meningitis about April 2 (is still

alive). Besides the parents there are two other children. Across the hall on the same floor lived the family O., with three children, who visited in the H. apartment constantly. On April 6 or 7, Mrs. O. says her daughter, Wilhelmina, aged eight years, was in the H. apartments and hung about Mrs. H., who was carrying her sick child about. On April 8, Wilhelmina became sick with typical symptoms of cerebro-spinal meningitis, and died April 11. Both apartments are quite clean, large, well-lighted and well-ventilated. No bugs; no pets. Interval between onset of two cases, six days.

38. At 308 East One Hundred and Sixth street, third floor, rear, there lived the families C. (man, wife and two children), and Ch. (man, wife and baby). Altogether they have three rooms (history obtained from neighbor as people were not at home). One of the babies became ill with cerebro-spinal meningitis and died. The second baby became ill two days after the first. Apartments in the house very dirty. No cats. Interval, two days.

39. John R., fifty-three years old, of 407 East Sixtieth street, died of cerebro-spinal meningitis on April 3, after an illness of four days There still remain of the family the wife and one son. Next door to R. lives the family P., relatives of the former. During the illness and at the funeral, Mrs. P. was in the R. home frequently. Some of the children were there also. Ten days after the funeral Nellie P., thirteen years old, developed cerebro-spinal meningitis. She is now recovering. The P. family occupy four rooms. Besides the mother there are six children.

40. Rosie B., of 231 Eldridge street, was a patient at Gouverneur Hospital suffering from cerebro-spinal meningitis. She ran an aypical course. Had slight tenderness at the back of the neck. Some difficulty in walking during convalescence. There was no eruption. Temperature dropped by crisis. No lumbar puncture was made. Max B., brother of the preceding, was taken sick about three weeks later and also ran a very atypical course. No rigidity, no Kernig sign. Had a peculiar macular bright red eruption which was regarded as possibly scarlet. A diagnostician from the Department of Health, however, pronounced it not scarlet. The spots were very close together and all over body. They resembled typhoid spots. Tempera-

ture dropped about the tenth and eleventh day. Spinal puncture was made three days after that (for diagnosis). It showed very many meningococci (Dr. Goodwin).

41. Theresa S., at 329 West Thirty-ninth street, was taken ill with cerebro-spinal meningitis on March 24, and died within twenty-four hours. Her sister, Rosie, who slept in another bed, developed the disease twelve hours after Theresa. She died in three days. There are five other children in the family.

42. Rosa P., aged six years, living at 222 West Thirtieth street, was taken ill with cerebro-spinal meningitis some time in January, dying in twenty-four hours. Six days later her mother developed the disease and died in forty-eight hours. The mother had about ten children, some of whom were married. Five unmarried children, however, still lived with her. Four rooms, quite clean, top floor back. Plenty of light. There is one cat. Bugs (?).

43. Evelyn D., five years old, of 147 West Sixtieth street, developed cerebro-spinal meningitis after an outing in the park. Her mother says the girl fell and struck her head. But there was no loss of consciousness and child appeared to be perfectly normal after the accident until about twelve hours after. During the night she was suddenly attacked with vomiting, headache and fever. Her physician was positive of the diagnosis cerebro-spinal meningitis. She died on April 10. There were no other children in the family. Just one week later a chum of Evelyn, living one floor lower in the same house, Annie McC., eight years old, developed cerebro-spinal meningitis and died in two days. Mrs. McC. says that during Evelyn's illness and at the funeral, her children had all been up to see Evelyn (there were five McC. children, all older than Annie).

44*a*. Julia C., of 406 West Forty-second street, six years old, taken sick with cerebro-spinal meningitis on May 3. Three days later her sister, E., three years old, developed the disease. Prior to Julia's illness she and Elizabeth slept in the same room, but not in one bed, Julia sharing a bed with her little brother, John. There is one cat in the house. No bugs; plenty of room. Clean (Elizabeth had been subject to repeated attacks of convulsions for a couple of years. Mother thinks perhaps cerebro-spinal meningitis diagnosis not true). Both

children were taken to Bellevue after Elizabeth was taken ill, and both died there.

44*b*. Julia C. attended a kindergarten in Forty-second street and had told her mother of a girl being sick there with cerebro-spinal meningitis. This case was looked up and proved to be Juliet B., aged four years, of 448 West Forty-second street. She was taken ill about February 6 and stayed at home until April 25. Then she returned to school for three or four days. Diagnosis of her illness not conclusive, though she had severe headache, was very drowsy and kept to her bed. She lost considerable flesh and was not able to walk well when she recovered. Her physician pronounced it cerebro-spinal meningitis.

45*a*. Caroline J., of 417 West Fortieth street, second floor front, six years old, was sick early in February with cerebro-spinal meningitis and died at the end of that month. There are two other children in the home (aged eight and nine years). The home consists of three rooms. There are no dogs, no cats. Children play all over, the mother going out to work by the day. On the ground floor of this house is the shoemaker shop of R. Here a boy, Paul R., aged two years, developed cerebro-spinal meningitis on April 10, was taken to the hospital on April 23, and died there April 28. There are two other children older in the house. Besides the shop the family have two living rooms only. There are no cats or dogs. Apartment moderately clean. It is not possible to connect this case directly with the preceding, though of course the children may have come in contact with each other.

45*b*. The J. girl attended a kindergarten connected with a small public school (eight small rooms). Directly next door to this school, one of the pupils, S. by name, died of cerebro-spinal meningitis December 21. He was in the class ahead of the kindergarten, and of course may have played with the J. girl. No positive connection between the cases can be established.

46. Blanche M. was ill with cerebro-spinal meningitis in 266 West Thirty-ninth street, and died. One of her chums was Kitty A., a classmate from school. Mrs. A. was afraid Kitty might contract the disease, so took her to the country after Blanche's death. Mrs. M. has recently heard of Kitty's death from the same disease.

47. No. 443 East Thirteenth street, a four-story tenement with a rear house. The following cases have occurred there, but it is not possible to find the connection between them: About six weeks ago a boy living on the second floor front, east, developed cerebro-spinal meningitis, dying in twenty-four hours. There is one other child, seven years old, but not affected (cannot find out name of the family). About two weeks later, James C., living on the top floor front, developed the disease. He is still alive (May 13). There are no other children in this family. Parents say James did not play with children of the first family. Two weeks after the onset of C.'s illness the disease appeared on the ground floor in the family of V., who keeps a butcher shop. His daughter, Annie, became ill and died in four days. There are two other children, but they were not affected. No cats; no dogs. Two days after death of Annie V., a baby, R., living in the rear house, second floor, was taken ill with cerebro-spinal meningitis. She died (?). No other children in the R. family. No intercourse can be made out between the various cases. A child died of cerebro-spinal meningitis in the family of L., 445 Thirteenth street, who keeps a saloon on the ground floor. His child was nine years old and died after an illness of five days. Typical symptoms. This was about six months ago.

48. Mrs. S., of 501 East Seventy-sixth street (tenement) had a baby sick with cerebro-spinal meningitis from February 10, 1905. The child died March 7. Among those who came to express their condolences was Mrs. Schn., living on the same floor, who stayed but a minute or two. On March 18 the latter's thirteen-year-old son developed the disease and died two days later. No other contact can be discovered. No other children. Each family occupies three rooms. Interval between cases, eleven days.

49. Mrs. W., of 871 First avenue (tenement) had a child die of cerebro-spinal meningitis on February 24, after an illness of three days. On March 17 the nine-months-old baby of Mrs. J., the janitress, developed the disease and died in ten days. Mrs. J. lives two floors below W., and although she renders no real janitor service (no dumbwaiter), visits the tenants to collect the rent. Interval between cases, twenty-two days. It may be remarkable in passing, that Mrs. W. lost

a child of cerebro-spinal meningitis in March last year, eleven months ago. At that time she lived in this same house.

50. In 75 Baxter street, an Italian family, B., living on the fifth floor of a large tenement, had a baby aged eight months sick with cerebro-spinal meningitis. Eleven days after the onset the baby's brother, eight years old, developed the disease and died in two days. On the seventh floor of this tenement lives another Italian family, C. Their baby, one year old, was taken sick with cerebro-spinal meningitis about three weeks after the B. boy had died and while the B. baby was sick in the house. The C. baby died in a week. There are other children in both families, and they all play together.

51. In No. 13 Little West Twelfth street, Mrs. F. had her four children all stricken with cerebro-spinal meningitis within a few days. All of them were at once sent to St. Mary's Hospital. Two of them died, one March 9, the other March 11. On the death of her two children Mrs. F. visited a family D. living on the floor below, and cried a great deal as she related her story to Mrs. D. Five weeks after the last child had been taken to the hospital, and about the same time since Mrs. F.'s visit just mentioned, the D. baby developed cerebro-spinal meningitis. The following day the five-year-old boy was taken sick, and three days later two more developed the disease. Three of these have died. There is considerable intercourse between the families. At the time these facts were elicited, four days after the last of Mrs. D.'s children had been sent to the hospital, nasal swabs were taken from both Mr. and Mrs. D. Both were found loaded with meningococci.

52. At 517 West Forty-sixth street, a young man, A., developed cerebro-spinal meningitis suddenly after playing ball in Central Park. He was treated at home for four days, and then sent to Roosevelt Hospital, where he died in two days. During his stay at home he had been nursed by his mother, Mrs. R. She developed the disease five days after the boy's removal to the hospital and died in two days. Interval between cases, five days.

53. At 428 West Thirty-seventh street, Kate D. developed cerebro-spinal meningitis on March 30 and was removed to the hospital the

next day. Her baby brother, thirteen months old, was taken sick eleven days after this and died in one day. Interval between cases, eleven days.

54. At 158 West Twenty-eighth street, a boy 2½ years old, the child of a fruit pedlar, M., developed cerebro-spinal meningitis. He was sick only one day and died March 29. Five days later two other children were taken sick. One of these has completely recovered; the other is still living (iv-18) in the hospital. Interval between first and second case, five days. A nasal swab taken from Mrs. M., fourteen days after the children were sent to the hospital, showed very many meningococci. Swabs made from the other children and from the convalescent case were negative.

55. In 86 Horatio street, Mary, aged six years, was taken ill with cerebro-spinal meningitis on Christmas eve. She was sick for about two months and recovered, although deafness resulted. A week after the onset, the girl's aunt, Elizabeth F., who lived in the same apartment and had nursed the girl, developed the disease and died after an illness of one week. Two weeks after the funeral of the aunt, and while the first case was still in the house, a little baby sister of this first patient became ill. She died after an illness of five weeks, during which time she had many convulsions and high fever. (The attending physicians said she died of convulsions due to teething and that she did not have cerebro-spinal meningitis.)

56. At 131 Thompson street, a boy, A., eleven years old, developed cerebro-spinal meningitis and died in twenty-four hours. Two months after this two other children living in this apartment, one a brother, A., aged six, the other a cousin, G. (aged four years), of the first patient, became ill. Both died after an illness of three or four days. Interval between the occurrence of the cases, two months.

57. At 515 East Twelfth street, John E., two years old, was taken sick the beginning of March. Three weeks later, while the first patient was still alive in the house, his brother (eight months) Andrew developed the disease. Both died about April 7.

58. At 307 East Forty-fifth street an Italian family, S., have a girl aged 3½ years, sick for the past two months with cerebro-spinal meningitis. A month after the onset the two-year-old boy in the family,

P., living on the floor above, developed the disease. Both patients still sick. There are other children in both families, but these are not ill.

The 58 instances represent 144 cases, as follows:

39 instances with 2 cases to a house	78 cases.
15 instances with 3 cases to a house	45 "
2 instances with 4 cases to a house	8 "
1 instance with 5 cases to a house	5 "
1 instance with 8 cases to a house	8 "

In 34 of these 58 instances there was an interval of varying length between the death or removal of the first case and the onset of the disease in the subsequent case or cases. The length of the interval may be tabulated as follows:

In 14 instances it was from 1 to 7 days.*
In 5 instances it was from 1 to 2 weeks.
In 4 instances it was from 2 to 3 weeks.
In 3 instances it was from 3 to 4 weeks.
In 2 instances it was from 4 to 5 weeks.
In 3 instances it was from 5 to 6 weeks.
In 2 instances it was from 7 to 8 weeks.
In 1 instance it was 3 months.

The incubation period of cerebro-spinal meningitis is usually considered to be about four days. If, therefore, we subtract from the above 34 cases the nine which developed within four days, we have 25 cases in which the question arises as to where the infecting organism was harbored in the meantime.

This question is answered, in part at least, by the results obtained by the bacteriological examination of nasal swabs from the parents of some of the children sick with cerebro-spinal meningitis. In three cases of the present series a large number of meningococci were obtained in cultures from these swabs (See cases No. 51 and 54). That the organisms are really meningococci will be seen by a study of Dr. Goodwin's paper on the bacteriology of the meningococcus. It may be added that in one of these cases the organism was obtained fourteen days after the last contact with patient, and in the other four days after such contact. Meningococci were also isolated from the nose of

*In nine of these 14 it was four days or less.

five cases suffering from cerebro-spinal meningitis. (Cases 12, 14, 21*a* and 29.)

In 18 of the 58 instances studied the second case developed while the first was still in the house. The interval between the onsets in these instances was as follows:

In 3 cases it was 1 day.
In 4 cases it was 2 days.
In 1 case it was 3 days.
In 1 case it was 5 days.
In 1 case it was 6 days.
In 4 cases it was 7 days.
In 1 case it was 9 days.
In 1 case it was 11 days.
In 1 case it was 21 days.
In 1 case it was 30 days.

In three of the instances encountered the disease occurred in the families of janitors and seems to have been communicated to or by them in the ordinary intercourse with the tenants. These are cases Nos. 9, 34, 39.

In two instances the disease appears to have been contracted in school. Cases no 44*b*, 45*b*.

In four instances mothers or other relatives taking care of children suffering from cerebro-spinal meningitis developed the disease. Cases 29, 42, 52, 55.

Period of Incubation—Case 7 of this series is of considerable interest, for it throws some light on the period of incubation. In this case two children developed the disease within two days of each other, and the only contact between them had occurred a day previous to the onset in one of them. If both children became infected from a common source the incubation period is *one* day for one child and *two* days for the other. If, however, the second child was infected from the first, the incubation period is exactly three days. The latter assumption seems the more likely, for this period of incubation agrees more closely with other cases in the literature. Thus Richter[11] gives the case of a woman who visited a house in which two children were sick with cerebro-spinal meningitis. She stayed in the house one day and then visited her uncle. Four days later she became ill with cere-

bro-spinal meningitis. During the last few days of her illness she was visited by a young man, who in turn developed the disease in a mild form four days afterwards. At the end of five days he was able to return to business. Five days after his return one of his fellow clerks developed the disease.

Dwelling Infections—There are practically no references in the literature to " dwelling or house infections," such as are seen in tuberculosis. As a rule, when more than one case is mentioned as occurring in a house or building the infection appears to have been a more direct one. In the present investigation we have not met with a single instance of true " house infection." In view of the feeble vitality of the meningococcus, this is about what was to be expected.

Summary To summarize our knowledge concerning the epidemiology of cerebro-spinal meningitis and the mode of infection we may say:

1. The disease has occurred in several large epidemics during the past century; sporadic cases are met with in the periods between these epidemics and constitute the link between the epidemics.

2. We do not know the circumstances giving rise to these epidemic outbreaks.

3. The epidemic form of cerebro-spinal meningitis is almost invariably associated with the meningococcus of Weichselbaum; the sporadic cases are frequently associated with this organism.

4. During the first week of the disease the meningococcus is present in the nasal mucus in fully half of the cases; later in the disease it is found in a smaller fraction of cases. It also occurs in the nasal secretion of some persons who are in close contact with cases of cerebro-spinal meningitis. In our series this was about 10 per cent. of the persons examined.

5. The meningococcus has a low vitality, being rapidly killed by drying and on exposure to sunlight. This makes infection by dust extremely improbable.

6. The disease seems distinctly communicable in the sense that the *organism is transmitted* from the nasal secretion of one person to another. The transmission of the organism, however, is not synonymous with *transmission of the disease.*

7. The susceptibility of the individual is an important factor in the development of the disease.

8. It seems unlikely that infection is frequently due to trauma or the result of overexertion.

9. Cerebro-spinal meningitis in other animals seems to have no connection with the disease in man. The subject, however, has not been sufficiently worked out to admit of positive statements.

10. There is no evidence to show that the disease is carried by vermin or insects.

11. The disease in some epidemics affects mostly infants, in others, older children, and sometimes chiefly adults. The reason for this is not at all clear.

12. The period of incubation seems to be short, from one to four days.

13. There is no evidence of the occurrence of "dwelling infections."

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The communicability of cerebro-spinal meningitis is also well shown by a report made to the Health Board in 1872 by Dr. Moreau Morris, City Sanitary Inspector. His report is so interesting that part of it is here reproduced.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.

By Moreau Morris, M. D.,

City Sanitary Inspector.

(From the Annual Report of the Board of Health, 1871-72.)

The following report on this disease is the result of investigations and records in the Bureau of Sanitary Inspection of the Health Department, which were made by its officers during the recent epidemic which appeared for the first time, as an epidemic, in The City of New York, at the beginning of the year (1872). Isolated cases had occurred during previous years as the records of the Bureau of Vital Statistics of this Department show. Deaths had been recorded from "Cerebro-spinal Meningitis;" in 1866, 48; in 1867, 32; in 1868, 34; in 1869, 42; in 1870, 32; in 1871, 48. The statistics of the disease as recorded therein are incomplete, as some physicians failed to recognize it, from want of personal familiarity with the affection during the beginning of the epidemic; and some neglected wholly to comply with the law in respect to reporting their cases to this bureau. It may be approximately estimated that probably about one hundred cases were thus not recorded to the bureau, which eventually recovered; which estimate should enter into the percentage of deaths to all cases.

During the early part of January, 1872, reports of "new form of disease" began to reach the Bureau of Sanitary Inspection. Some called it "spotted fever," others "epidemic meningitis," a fever resembling typhoid, and typhoid complicated with acute meningitis.

* * * * * * *

The statistics of the disease as it prevailed in this city, and as reported to the Health Department, from January 1, 1872, to November 1, 1872, are here presented in a tabular form:

Total number of cases reported	990
Total number of deaths reported	761
Total number of houses in which cases occurred	835

Number of houses in which 1 case occurred	741
Number of houses in which 2 cases occurred	68
Number of houses in which 3 cases occurred	13
Number of houses in which 4 cases occurred	1
Number of houses in which 5 cases occurred	2
Number of cases reported from hospitals included in the above total	60

By these statistics it appears that by far the largest proportion of cases occurred in different houses, 741 houses having but 1 case in each, out of the whole number of 835 houses in which it occurred, and this fact also strikingly illustrates the fact of its non-contagious character. Indeed it must be conceded that so large a distribution of single cases, had this disease been one of the contagions, must have added thousands to its numbers, and whole households have been stricken with it, instead of confining itself to one susceptible victim.

The greater susceptibility and fatality in youth is also strikingly exhibited in the large number attacked under 15 years of age, as shown in the accompanying table.

Total Number of Deaths from Cerebro-spinal Meningitis as Recorded in the Bureau of Vital Statistics Under Their Respective Ages and Sex, for the Period from January 1 to November 1, 1872.

	Under 1 year.	Bet. 1 and 5 years.	Bet. 5 and 10 years.	Bet. 10 and 15 years.	Bet. 15 and 20 years.	Bet. 20 and 25 years.	Bet. 25 and 30 years.	Bet. 35 and 40 years.	Over 40 years.	Total.
Males	60	141	81	29	23	27	13	12	18	404
Females	56	123	56	50	18	12	13	13	16	357
Total deaths both sexes	116	264	137	79	41	39	26	25	34	761

*　　*　　*　　*　　*　　*　　*

1. Albert Brown, residing at 443 Eleventh avenue, aged 6 years and six months, was, on the forenoon of January 30, 1872, kicked in the side by a boy, and fell, striking his head against an iron railing. At 1 o'clock P. M. he reached home, but made little complaint of his injury until toward 7 o'clock that evening. He died on the morning of the 31st at 4 o'clock. No physician saw him whilst ill, and there is, therefore, no account of the symptoms.

At post-mortem examination by the Deputy Coroner, Dr. Beach, showed a thin layer of extravasated blood covering the surface of the brain, and extending to its base with bloody serum in the ventricles. Dr. B. looked on the case as one of concussion of the brain with rupture of a small vessel. There was a large patch of ecchymosis at the sight of the kick, but no signs of peritonitis or other abdominal mischief. Some dark purple spots irregularly scattered over the trunk were noticed.

2. Maximillian Brown, age four years, in good health during the day and playing up to 4 o'clock, was, at 11 o'clock P. M. February 4, 1872, seized with vomiting and spasms without loss of consciousness. He seemed in a fright and called constantly after his lost brother, case 1. He was seen at midnight by a physician. He died February 5 about 7 A. M. The medical attendant states that the brain symptoms were prominent; he did not look for any eruption. Meningitis was reported as the direct cause of death. No autopsy.

3. Theresa Brown, age 13 years, was taken, February 6, at 2 o'clock A. M. with pain in the head, moaning and crying out. She was seen by Dr. Sewell at 9 A. M. She had been sitting up during the night at her brother's " wake," and had been much affected by the sudden death of her two brothers. When first seen intelligence was perfect, the pulse rapid, the skin of natural warmth and moisture. There had been some vomiting. She complained only of pain, not severe, over the whole head. Bromide of potash was ordered, with sinapisms to the feet and nape of the neck.

February 7, 10 o'clock A. M.—She was in much distress, complaining of her head, and her mind was wandering. The pupils were somewhat dilated. Intelligence good. There was much hyperaesthesia of the entire surface, with tenderness of the large joints, which she said was rheumatism, having once suffered from it. Pulse 120 in the minute, and of good volume. The tongue was covered with thick white fur, but was not dry. She had not slept during the night; had vomited, and the bowels had been moved. At 4 P. M., she still complained of her head and limbs. The inhalation of chloroform had procured some sleep. A petechial eruption, not abundant, over the trunk and thighs. It varied in size from a pin's head to a canary seed;

did not disappear on pressure, and was of a deep purple hue. A diagnosis of "spotted fever" was made, morphia, half a grain every second hour, beef tea and milk punch were ordered. February 3, 9 A. M.—Pulse 120 and feeble; extremities cool; tongue and purpuric spots as before. Still complained of head and of great sensitiveness of the skin. Much delirium and crying out, but the intelligence was good and attention easily secured. Body near 98 Fahr., treatment continued. At 4 P. M. she was more composed; the purpuric spots were paler; face a little flushed; skin natural; pupils contracted readily to light; pulse 116 and with more volume; mind clear; tongue unchanged. February 9, 10 A. M.—Passed an indifferent night, having been restless and delirious. Pulse 130 and feeble; skin warm; tongue whitish. For the first time since her illness says that she had no pain in the head or elsewhere. Petechiae present, urine free, bowels open. Treatment continued.

At 7 P. M. the pulse was 116 and fuller; no pain; had rather an uneasy day, though she slept at intervals. Takes milk and beef tea moderately.

February 10.—Had been restless and delirious all night, and again complains of pain in head. Pulse 108 and of good character. Eruption less and of a paler hue; tongue more coated but not dry.

February 11, 2 P. M.—Had slept soundly all night; pulse 86-88; eruption nearly gone; no pain in head or back, though a little in limbs. Skin rather cool, particularly of the extremities; tongue clearer. Sitting up; taken milk and broth freely.

February 12.—Slept well; very irritable; pulse 96; a little pain in head and back of neck; eruption scarcely visible; tongue clearing; lips parched and dry; skin rather warm; urine free; clear with no change on the application of heat; bowels costive; drinks milk punch. Subsequently recovers.

4. Bertjold Brown, age 11 years. Was first seen on the morning of February 7, about 10 o'clock, lying on a couch, moribund, with a cadaveric expression, and deep ictercode hue. Pulse very rapid and scarcely perceptible, skin dry and hot; mind not clear and he could hardly be roused; pupils contracted; complained chiefly of his head. He had been to his brother's funeral the previous afternoon, a distance of six or seven miles. He seemed well on his return home and ate a hearty

supper. Between 7 and 8 on the evening of the 6th of February he sickened, with pain in the head, vomiting, purging and chill. There had been no convulsions. He died at 2 P. M. February 7, eighteen hours after he was first attacked.

"Autopsy—February 8, 11 o'clock A. M.—Rigor mortis strongly marked. An eruption similar to that of the girl's (case 3) but in greater. Only on the body. The serous and mucous coat of the stomach showed purpuric spots similar to those on the body. It was also scattered, though less abundantly, over the peritoneal coat of both small and large intestines, lungs, heart, liver and kidneys were healthy. The blood was fluid. The whole of the surface of the brain was intensely congested, the veins and sinuses being gorged with very fluid blood, though not entirely devoid of coagula. On section of the brain little points of blood netted out everywhere. The ventricles were nearly dry. Consistence of brain natural. No exudation or purulent matter found.

5. February 10.—About midnight the baby, one year and three months old, was taken suddenly ill; she vomited and had several loose stools. There were slight muscular spasms, but no decided convulsions; she died at 9 A. M. The body was covered with an abundant purpuric petechial eruption.

Description of premises—This family lived on the ground floor of a house which was one of a row of wooden buildings, whose cellars had been made by filling up and grading of the avenue in front, and of the yards in rear. A good stone wall foundation had been built underneath. The apartments occupied were (a) a medium-sized front room, used as a tin shop and store; (b) a rear room, used for the general purposes of the whole family; (c) a small passageway leading from the front to the rear rooms in which some of the children usually slept in a small crib, and (d) a bed room between the rear room and shop. In this bed room which had no other means of ventilation than the door, the father, mother and some of the children slept. The whole family was thus chiefly confined to the rear room and the small unventilated bed rooms one floor on a level with the street and yard.

At No. 6 Lewis street there were 4 deaths, two girls, aged respectively 18 and 20, and two children, they all slept in a room 10 by 15 feet.

THE FREQUENT OCCURRENCE OF MENINGOCOCCI IN THE NASAL CAVITIES OF MENINGITIS PATIENTS AND OF THOSE IN DIRECT CONTACT WITH THEM.*

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Every one familiar with the investigations concerning the etiology of meningitis knows that, owing partly to the difficulty of isolating and keeping alive the meningococcus, partly to its similarity to other micrococci, the work of most investigators has been incomplete and therefore of little permanent value.

As the amount of influence which the results of the investigations here recorded may exert depends largely on the degree to which others are convinced of the thoroughness of the identification of the organisms found in the nasal cavities, it seems best to review briefly the literature in order to see what characteristics the best observers consider as belonging to the meningococcus, and therefore as necessary to prove the identity of the suspected organism.

The first important study of the etiology of primary cerebro-spinal meningitis was undertaken by Weichselbaum in 1887. Before that time it had been pretty well established that in secondary cases the pneumococcus was at times the exciting factor, though Leyden[1] and Leichtenstein[2] had noted diplococci in the exudate of fatal cases of primary cerebro-spinal meningitis, which they believed to be different from pneumococci. Their descriptions lead one to think that they really saw the meningococcus, but that their work was too meager to establish this..

In 1887 Weichselbaum[3] isolated, and carefully studied, cultures from six typical cases of cerebro-spinal meningitis. The cocci had the following cultural characteristics: They grew well on nutrient agar-agar containing 2 per cent. of gelatin. The growth on the surface was rather flat and viscid; it was gray in direct and grayish white in transmitted light. The borders were indented and showed the growth to be made up of confluent colonies. Potato showed no visible growth. On the agar-gelatin plates the deep colonies were very small. The surface colonies were grayish white. Under the microscope they were round or irregular, finely granular, and their borders indented. They had a golden brown nucleus, an inner light yellow zone, and an outer one which was trans-

* Technical portion of Part I. of an investigation of cerebro-spinal meningitis carried on under the auspices of the Special Commission of the Department of Health of New York City.

parent and colorless. Weichselbaum found it necessary to transplant the cultures every two days in order to keep them alive, as they were found to die usually in from three to six days. The cocci themselves were mostly in pairs; some were single, and a few in tetrads and small heaps. The single cocci were round, the pairs flattened at the apposed ends. The cocci varied greatly in size and staining, the larger forms, which stained more deeply, being sometimes twice as large as the smaller, more faintly staining ones. They were mostly intracellular in the exudate, and were found only in small numbers in the tissues. All the cultures were Gram negative, and grew well only at blood heat. They did not grow at all at 20° C.

In 1895, H. Jaeger[4] published the results of the study of fourteen cultures isolated from typical epidemic cerebro-spinal meningitis. The organisms he isolated differed from those of Weichselbaum and more recent investigators in the following characteristics: There were short chains of four to six elements present in all the cultures, and in two cultures there were long chains of twenty to thirty. He describes the cultures as being sometimes Gram positive and sometimes negative. However, he never found Gram positive cocci in the tissues. His cultures grew at lower temperature. The viability of his cultures was much greater, one culture in broth living forty-three days. The culture stood drying for ninety-six days and pus dried on linen gave a growth of the cocci after 127 days. A capsule was present in the smears.

A. Heubner,[5] Jaeger's strongest supporter, describes cultures from four cases which were identical with Jaeger's. Jaeger, in his article of 1899,[6] still clings to his description of 1895. In 1901[7] he decides that the meningococcus has no capsule, but in other points holds to his original position.

Between Jaeger's first and last papers a series of investigations had been carried on which demonstrated to most bacteriologists that either he had failed to isolate the true organisms exciting the disease, or had allowed contaminating or associated bacteria to overgrow and displace the meningococci in his cultures.

Councilman, Mallory, and Wright,[8] after a thorough study of thirty-one cases, describe their cultures as being similar to those of Weichselbaum.

In 1901, Albrecht and Ghon,[9] after working with twenty-two cultures, agreed with Weichselbaum. The greater number of cultures observed led them to give wider limits of temperature as suitable for development. Some cultures grew from 25° to 42°, though the maximum growth was always between 36° and 37°. They are the first to describe the "bread crumb" granules found in the centre of the colony after forty-eight hours. They give the best media as Loeffler's blood serum, or agar containing ascitic fluid. A pellicle on the broth cultures, when the broth was neutral and the cultures were left quiet for several days, was almost constant. In a few instances they kept cultures alive, when protected from drying, for 185 days without transplanting. All the cultures were Gram negative, and there was no tendency to chain formation. Albrecht and

Ghon obtained cultures from Jaeger and from Heubner, and found them not only quite different from theirs, but also unlike each other.

Albrecht and Ghon,[10] and Weichselbaum,[11] in convincing articles published in 1903, take up the peculiarity of Jaeger's cultures point by point, and are of the opinion that he was not working with true meningococcus cultures. Taking the important points agreed upon by the best workers, Albrecht and Ghon give the following characteristics as essential in identifying true meningococcus cultures:

1. Gonococcus-like in form, dividing in the same way, always Gram negative, having many degeneration forms, and often intracellular.
2. Growing only at fairly high temperature, 25° to 42°, maximum growth at 36° to 37°.
3. Colonies on agar plates luxuriant, quite viscid, glistening, gray in direct light and grayish white in transmitted light.
4. Growth confined almost entirely to surface in stab culture.
5. Develops pellicle on broth culture (when the broth is neutral and the cultures are undisturbed for several days).
6. Slight pathogenicity for ordinary animals.
7. Non-resistant.

Micrococcus Catarrhalis.

In 1901, Ghon and H. Pfeiffer[13] published the results of the study of forty cultures of Micrococcus catarrhalis. They found that, while it grew best on blood agar, it would grow on ordinary media. It differed from the meningococcus in growing more easily, more luxuriantly, and at a lower temperature. The colonies under the microscope were darker, more compact, and had more abrupt margins. Jaeger[14] finds all the strains of M. catarrhalis self-agglutinating. Some of the cultures examined by us have had all the above characteristics, while others have more nearly resembled the meningococcus.

Meningococcus Cultures Isolated by Previous Investigators from the Nasal Mucus.

In going over the literature we are impressed with the small number of cases from which thoroughly identified meningococcus cultures have been isolated from the nasal mucus. The cases from which Gram negative diplococci closely resembling meningococci have been found in the smears from the nose and throat are, on the contrary, numerous and have been found by nearly all workers on meningitis.

The first to identify as meningococcus a culture taken from the nasal mucus was F. Kiefer.[15] While working with meningitis cultures, he developed a severe purulent rhinitis. The pus contained numerous meningococci. In 1898, Schiff[16] isolated cultures from three out of twenty-nine dispensary patients, a portion of

whom suffered from chronic laryngitis, which cultures, he says, Weichselbaum considered true meningococci. These three cultures will be considered later in connection with two obtained by us from medical students, which agreed with the meningococci obtained from the spinal fluid in all respects except in agglutination characteristics. Councilman, Mallory, and Wright[8] report one culture from the throat of a tonsillitis case. Griffon and Gandy[17] twice, at an interval of five days, isolated cultures from the nose of a meningitis case which were identical with cultures from the spinal fluid. Albrecht and Ghon[9] report two instances, one a case of meningitis, the other from a man whose child died of meningitis three days before the culture was taken. F. Lord,[18] of Boston, isolated meningococci from a case of rhinitis. A. Weichselbaum and Ghon[19] identified one culture from the nose of a meningitis patient and three from the noses of people in contact with patients. These cultures from the fourteen cases were the only ones we could find that were studied with sufficient care to warrant their acceptance as true meningococci.

Original Investigation.

Most of the material for this investigation was obtained through the courtesy of Dr. A. W. Taves, of Gouverneur Hospital.

The mucus was taken from the nasal fossæ with a sterile cotton swab and plated out as soon as possible on ascitic agar. As a rule the plates were made within one hour of collecting the specimen, while the swab was still moist. These plates were incubated from 24-48 hours, then fished in the usual way. The colonies were put on blood agar, which seemed to be the most favorable medium.

Several colonies were fished from every type found which resembled a meningococcus colony in color or granularity, and which under the high power showed diplococci resembling meningococci. The organisms from the cultures were stained by Gram, and several of the Gram negative ones, which in cultures resembled meningococci were kept for study.

Fifty-two meningitis cases were examined. Meningococci were isolated from 12 of the 22 cases examined during the first week, and from five of the 15 examined during the second week. In six cases examined during the third week, three during the fourth, and six between the fifth and ninth weeks, no meningococci were found, while in a very severe case examined on the 67th day we found a few

colonies. In one case we failed to get them on the first day and found them in large numbers on the second.

From this it would seem as though the meningococci were present in a rather large percentage of the cases during the first week.

The nasal secretions of 45 healthy persons living in close contact with meningitis patients were examined. In five of these meningococci were isolated during the first two weeks of the patients' illness. From the nasal mucus of 55 medical students who had never been in known contact with meningitis there were isolated in two cases a few organisms which were, culturally and in inoculation experiments, like meningococci.

In studying the agglutination of these cultures from medical students, we found that they differed from our other cultures in their specific agglutinins, and therefore were differentiated in one important respect from them. In this connection it is of interest that Schiff, in describing his cultures from the nasal cavity of people not in contact with meningitis, does not refer to agglutination, and evidently did not make the test. His cultures may have differed as ours do. One cannot safely classify these atypical cultures. They may be meningococci derived from strain different from those isolated by us in the present epidemic, or organisms not capable of readily exciting meningitis, and yet so closely related that they cannot be differentiated without more careful cultural tests than we at present use.

The following tables give the cases, the day of the disease when the specimen was taken, the termination of the disease and the bacteriological findings.

TABLE I.

Cases of Meningitis in Which Meningococci Were Isolated from the Nasal Mucus.

Name.	Day of Disease.	Termination.	Percentage of Meningococcus Colonies Present in Plates.
W. W	1	Died	About 55
J. N	2	Died 3d day	" 90
L. Z	3	....	" 30
E. R	3	Died 4th day	" 50
R. T	3	Died	" 40
J. G	4	....	" 95
Mrs. M	4	Died 6th day	Very few
S. F	5	Died	About 50
S. K	5	....	" 90
J. S	5	....	" 30
D. M	7	Recovered	" 2
C. P	7	....	Few
M	10	Died	About 10
M. G	10	Died	" 2
J. M	12	Died	A very few
M. H	14	....	About 95
E. S	14	Died	" 5
S. K	67	Died 69th day	" 2

Contacts with Meningitis Cases from Whom Meningococci Were Isolated from the Nasal Mucus.

Name.	Day of Contact.	Condition.	Percentage of Meningococcus Colonies Present in Plates.
Mr. D	4	Normal	About 95
Mrs. D	4	"	" 95
Mrs. K	14 still in contact	"	" 95
A. K	14 "	"	" 50
Mrs. M	14	"	" 30

The plate cultures from the mucus of all these cases contained many colonies and in most cases eat numbers of colonies.

Table II.

Cases of Meningitis in Which Meningococci Were Not Isolated from the Nasal Mucus.

Number of Cases.	Day of Disease.	Number of Cases.	Day of Disease.	Number of Cases.	Day of Disease.
1	1	2	13	1	24
1	2	5	14	1	27
2	3	1	15	1	28
5	6	1	17	1	31
1	7	1	18	1	40
1	9	1	19	1	42
1	10	1	20	1	49
1	11	1	21	1	60

Table III.

Contacts with Meningitis Cases from Whom No Meningococci Were Isolated from the Nasal Mucus.

Number of Persons.	Days Since Contact.	Number of Persons.	Days Since Contact.
5	2	1	35
9	3	1	50
2	4	3	56
1	10	1	60
1	18	16	Still in contact.

All contacts were occupants of the same rooms, and nearly always members of the family.

From 14 cases we took multiple specimens. In only one case did we find meningococci in two specimens, 90 per cent. on the fifth day, and a very few on the tenth. The following table gives the cases, the day of disease and the bacteriological findings:

TABLE IV.

Cases of Meningitis from Which Multiple Specimens Were Examined.

Name.	Day of Disease.	Termination.	Findings.
B. I	13	Recovery.	No Meningococci.
B. I	14	....	"
B. I	15	....	"
B. I	16	....	"
E. E	2	Died 7th day.	"
G. D	3	....	"
G. D	7	Died 45th day.	"
G. D	13	....	"
G. D	19	....	"
K. S	5	....	90 per cent.
K. S	10	....	A few.
K. S	16	....	No Meningococci.
M. D	7	Recovered.	2 per cent.
M. D	13	....	No Meningococci.
M. D	19	....	"
C. P	3	....	"
C. P	4	....	5 per cent.
C. P	5	....	No Meningococci.
C. P	7	....	"
C. P	8	....	"
C. P	9	....	"
S. M	2	....	"
Si M	6	....	"
S. M	8	....	"
S. J	6	Recovered.	"
S. J	7	....	"
S. J	9	....	"
S. J	10	....	"
S. T	3	Died 10th day.	"
S. T	4	....	"

Name.	Day of Disease.	Termination.	Findings.
S.J.	5	....	30 per cent.
S J	10	....	No Meningococci.
S. J	18	....	"
W. F	3	....	"
W. F	4	....	"
W. J	17	....	"
W. J	18	....	"
W. J	19	....	"
W. J	20	....	"
W. J	22	....	"
Z. L	1	....	"
Z. L	3	....	30 per cent.

Cultural Characteristics of the Meningococci Isolated from the Nasal Mucus.

The cultures isolated from the nasal mucus were carried out on the different laboratory media and compared with 30 cultures isolated from a similar number of specimens of spinal fluid.

There were no apparent differences between the nose and spinal fluid cultures. Some grew more luxuriantly than others. The more luxuriant cultures from both spinal fluid and nose seemed to have a more yellow tone, while those growing in a thinner layer were grayish white.

The morphology of the organisms differed slightly, but the differences were the same for cultures from both sources.

The meningococci occurred as flattened cocci in pairs, fours, and sixes. They varied widely in size in the same culture from the same media, and differed greatly in the intensity with which they took the stain.

In no case did a culture tend to be Gram positive. Cultures were repeatedly plated out, and numerous colonies fished and stained by Gram. In a culture transplanted twice a day for five days on Loeffler's blood serum, so that the organisms might all be very young; there was no tendency for any of them to be Gram positive.

In no culture was any tendency to chain formation observed. The cultural characteristics of colonies on ascitic agar plates were as follows:

1. *Macroscopic appearance.*—In many cultures there are two distinct zones, but this was not found constant on repeated plating. Where the colonies are in contact, they are usually divided by a distinct line. They are oval or irregular, grayish-white to yellowish-white, moist and unusually viscid, flowing about the needle instead of breaking away from it when they are fished.

2. *Microscopic appearance: Low power.*—Pale amber to brown in color. From fine and evenly granular colonies to those with very coarse central granules. Margins generally rather even and often not abrupt.

3. *Microscopic appearance: High power.*—The diplococci and occasionally the fours show plainly. On some plates the margins are smoother and abrupt, and the separate organisms are distinguished with difficulty.

The most constant characteristics seem to be the coarse central granules and the characteristic separate organisms at the margins when observed with higher power.

Ascitic agar slants.—Grayish white, fairly luxuriant growth, usually with discrete colonies. The colonies at times have a diameter of five millimeters at forty-eight hours. They are generally quite round, but vary a good deal in the waviness of their outlines. Two zones are often distinguished. In the smears from ascitic agar the organisms stain poorly and are indistinct.

Loeffler's blood serum.—The growth is heavy, moist, confluent and yellowish. The smears show the organisms distinctly, and usually of larger size than on ascitic agar.

Plain agar.—Growth scant, if any, and generally consisting of a few isolated colonies.

Glucose agar.—Growth slightly better than on plain agar.

Glycerin agar.—Same as plain agar.

Blood agar.—Growth very luxuriant, confluent, yellowish white and extremely sticky; smears same as from Loeffler's.

Sheep serum agar.—Growth fairly luxuriant, about the same as ascitic agar.

Gelatin.—No cultures grew below 24°. At 37° C. all the cultures grew well, with the formation of a heavy pellicle. At the end of six weeks the gelatin still hardened when put in the ice box.

Hiss's inulin medium.—Rendered opaque but not coagulated.

Litmus milk.—The cultures grow only slightly and turn the milk somewhat darker than control at the end of forty-eight hours, but make no further change.

Marble broth.—Most of the cultures grow slightly, a few grow well, making the medium cloudy, afterward forming a pellicle and sediment. The pellicle is quite general after one week.

Plain broth.—Very few cultures grow in our broth and these only slightly. This was possibly due to an unsuitable reaction of the broth.

Dunham's peptone solution.—Growth very slight. Indol not produced.

Glucose litmus peptone sheep serum agar.—Acid produced after forty-eight hours.

Lactose litmus peptone sheep serum agar.—Acid not produced after forty-eighth hours.

Maltose litmus peptone sheep serum agar.—Acid produced after forty-eight hours.

Saccharose litmus peptone sheep serum agar.—Acid not produced after forty-eight hours.

Mannite litmus peptone sheep serum agar.—Acid not produced after forty-eight hours.

Temperature.—The maximum growth was about 37°. Nearly all the cultures grew at 30° three months after isolation; a few grew slightly at 24°.

Viability.—The cultures varied greatly in the length of time which they would live without transplanting. In order not to lose cultures, we reinoculated them every five days. Many of the cultures on ascitic agar lived from ten to twenty days without protection from drying, and some of the broth and gelatin cultures lived from five to eight weeks. After twenty-five cultures were kept in the ice box for five days, none of them were alive. Cultures left at room temperature and in the ordinary amount of light varied greatly in their resistance. Most of them failed to grow after forty-eight hours.

Agglutination.

Albrecht and Ghon[9] and Bettencourt and Franca[20] found that the serum of meningitis patients agglutinated meningococci in from 1.10 to 1.100 dilutions. They found that the serum of animals immunized for a long time with meningococci agglutinated the cultures only in low dilutions, 1.100 being the highest. We tested the serum of very few patients. The highest dilution agglutinating was 1.200.

Finding it impossible to distinguish between nasal and cord cultures by morphological or cultural comparison, we have made use of a specific serum to aid in classifying the cultures from the different sources.

We inoculated two horses, two sheep, three goats and 20 rabbits. Only two rabbits lived long enough to give a serum of sufficient agglutinating strength to help in our work. Of these two, one was inoculated with W., a nasal culture from a student not in contact with meningitis. This serum agglutinated its own culture and several typical meningococcus cultures completely in a dilution of 1.40. The other was inocu-

lated with a cord culture, and agglutinated its own culture in a 1.400 dilution, and other cultures in a 1.50 or slightly higher dilutions.

One sheep, after being inoculated with rather large doses of a cord culture for over three months, gave a serum agglutinating most of the cultures completely in a 1.40 dilution. The goat sera never agglutinated above 1.20.

One horse was inoculated with a nasal culture obtained from a severe case of meningitis on the second day of the disease. The patient died on the third day. This horse died after a month's treatment, before the serum was of much value. The other horse was given a cord culture, and though he became very sick at the end of the first month he improved when given smaller doses. At the end of four months the agglutinating strength of this serum was 1.100 for most of our cultures. It seemed better for some other cultures than for its own.

There was a great difference in the degree of agglutinability of the cultures on different days, which made it very difficult to compare the results quantitatively.

The following tables give some of the serum tests with cultures from the spinal fluid and noses of patients, and from the noses of contacts and from people not in contact. As a rule, the majority of the cultures seem to agglutinate as well as the culture with which the animal was inoculated.

Table V.

Agglutination of 22 Cultures Obtained from the Spinal Fluid, and of 21 from the Nasal Mucus by Sheep 182 Serum After Animal Had Been Inoculated for Three Months.

	Control.	1:20	1:50	1:100	1:200	1:400
33-2n	—	+	++	+	+	—
X1-2n	—	+	++	+	—	—
124-1c	—	+	+	±	1	—
VII.-3n	—	+	+	1	—	—
W. P. 1c	—	+	+	±	—	—
108-5c	—	+	+	±	—	—
D. Getz c	—	+	+	±	1	—
Wiesbard c	—	+	+	+	—	—
100-2c	—	+	+	±	1	—

	Control.	1:20	1:50	1:100	1:200	1:400
95-2n	—	±	I	—	—	—
140-2c	—	+	I	±	—	—
91-1n	—	+	+	+	I	—
114-2n	—	+I	±	—	—	—
152-1c	—	+	+I	±	I	—
M142-2n	—	+	±	±	±	—
Preglia c, 140-3c	—	+	+	±	I	—
Stolz-2n	—	+	±	I	—	—
Cohen c	—	±	±	±	I	—
Fieland cord c	—	+	+	+	I	—
Fieland nose n	—	+	+	+	±	—
Goldfarb cord c	—	+	+I	+	—	—
Schwartz n	—	+	+	—	—	—
Goldfarb nose n	—	+	±	±	—	—
182 s. c	—	++	++	—	—	—
Merrit n	—	+	±	I	—	—
136 s. c.	—	+	+	+	I	I
23-2n	—	++	+	—	—	—
IX.-2n	—	+	—	—	—	—
Horrowitz c	—	—	—	—	—	—
14c	—	++	—	—	—	—
105-5n	—	+	+	±	—	—
253-5c	—	+	—	—	—	—
36-8n	—	++	++	—	—	—
29-3n	—	+	+	+	±	I
85-1n	—	+	+	I	—	—
142-s. c	—	+	±	—	—	—
Bayridge c	—	+	—	—	—	—
Rubin n	—	±	+	±	I	—
Mersu n	—	+	+I	±	I	—
Fielder c	—	+	+	+	—	—
Gruno c	—	++	++	+	I	—
McDonald n	—	±	+	I	—	—

In testing the agglutinating power we used emulsions made from 24-hour sheep serum agar slants in normal salt solution. We used hanging drops, with the slides inverted until the moment of examination, to prevent mistaking mechanical grouping for agglutination. The hanging drops were usually examined after four hours and marked in the following way: — = no agglutination, I = trace, ± = marked trace, + = good agglutination, +I = very good agglutination, ++ = complete agglutination.

c. Indicates culture isolated from spinal fluid.
n. Indicates culture isolated from nasal mucus.

We saturated the best horse serum with its own cultuie, with nasal cultures from a severe meningitis case, with a contact with a non-contact, and with several M. catarrhalis cultures. After allowing the mixture of serum and culture in a 1:5 dilution to stand for three hours, we filtered through a Berkefeld filter, and used the third 10 c.c. of the filtrate. All the meningococcus-like cultures seemed to remove the agglutinins for all the cultures, while the M. catarrhalis cultures only reduced them about one-third. The control filtration of the serum without exhaustion reduced the agglutinins about as much as the M. catarrhalis cultures.

TABLE VI.

Tests of the Serum of Horse 277, After Being Inoculated for Four Months with 142 S., a Spinal Fluid Culture.

	Serum.		Serum Extracted with XI-2, a Meningococcus Culture from the Nasal Mucus of a Meningitis Patient.			Serum Extracted with a M. catarrhalis Culture from a Meningitis Case.		
	120	1:40	1:5	1:10	1:20	1:5	1:10	1:20
Gruno c.	+	+	—	—	—	+1	+	1
Fielder c.	+	+	—	—	—	+1	+	1
142 Sc.	+	+	—	—	—	++	±	±
XI-2 n.	+	+	—	—	—	++	1	1
33-2 n.	+	+1	—	—	—	++	1	1
36-8 n.	±	±	—	—	—	++	—	—
W. n.	+	+	+1	1	1	+	+	±

These sera, after being extracted, were in a 1:5 dilution filtered through a Berkefield filter and the third 10 c. c. used.

We saturated this same horse serum with a meningococcus culture, with a M. catarrhalis culture, and with W. n. from a student, a non-contact case. Instead of filtering we centrifuged, and found our results somewhat different. The meningococcus culture took out all the agglutinins for the meningitis culture and not for the others, while the M. catarrhalis and the W. n. left in over half the agglutinins for the meningitis cultures. The M. catarrhalis agglutinated spontaneously, but the non-contact W. n. took out all of its own agglutinins.

TABLE VII.

Tests of the Serum of Horse 277, After Being Inoculated for Four Months with 142 S., a Spinal Fluid Culture.

	Serum Unextracted.		Serum Extracted with a Spinal Fluid Culture.		Serum Extracted with W. n., a Culture from a Person Not in Contact with Meningitis.		
	1 : 100	1 : 200	1 : 10	1 : 20	1 : 20	1 : 40	1 : 100
Gruno c	+	–	–	–	+	1	–
Fielder c	+	–	–	–	+	1	–
142 Sc	+	–	–	–	+	1	–
XI-2 n	+	–	–	–	+	1	–
33-2 n	+	–	–	–	+	1	–
36-8 n	+	–	–	–	+	1	–
W. n	+	–	–	–	–	–	–

The sera, after being extracted, were centrifuged instead of filtered.

PATHOGENICITY.

Weichselbaum, in 1887, with his original cultures, killed white mice with an intraperitoneal or intrathoracic inoculation of 5 c.c. of a broth dilution of an agar culture or the water of condensation. The mice died in 36-48 hours, and the meningococci were found in the cavity inoculated and usually in the blood. Subcutaneous inoculations were without result. He killed guinea-pigs by inoculating them in the thoracic cavity; but the cocci were not found in the blood or spleen.

Three dogs inoculated subdurally with 1 c.c. and 1.5 c.c. of culture dilution died, one the same evening, the second on the third day, and the third on the 12th day. The first two showed a small amount of fluid blood between the dura and brain. There was a small area of punctiform hemorrhages deeper in the brain, and the membranes were markedly injected. Numerous meningococci were found. In the third day, between the dura and the right cerebral hemisphere, there was thick red pus, and in the brain a hazel-nut sized abscess containing yellow pus. Around the abscess was a hemorrhagic area. The lateral ventricles contained a red fluid with flakes of pus. No meningococci were found.

Albrecht and Ghon inoculated a goat in the spinal canal, which developed symptoms of meningitis and died in five days. The cord showed no changes and meningococci were not isolated.

Our animal work was rather irregular in its results. By inoculating mice intraperitoneally with .5 of a 24-hour ascitic agar culture of either the cord or nose strains, we caused death in 24-48 hours. There was marked congestion of the abdominal viscera, and meningococci were found in the blood and peritoneal exudate.

Rabbits were very uncertain. A few died from subdural inoculation of rather large doses, but there were no typical lesions, and none of them contained meningococci in the blood or exudate.

With small puppies we obtained about the same results as Weichselbaum. When given a dose of two ascitic agar cultures in the spinal canal, the dogs usually died in 24 to 48 hours. They had convulsions and some rigidity of the neck. On autopsy the membranes were much injected and there were hemorrhagic areas in the cortex. Meningococci were found in these areas, in the fluid under the dura, and in the spinal fluid.

As controls to our meningococcus cultures, we used M. catarrhalis cultures and two cultures corresponding culturally to meningococci, which had been isolated from the nasal mucus of normal medical students. The dogs inoculated with two ascitic agar cultures of M. catarrhalis did not die, while those which received the cultures from the students died in 24 hours, and gave the same autopsy results as the dogs inoculated with meningococci.

Conclusions.

Meningococci were isolated from the nasal mucus of 50 per cent. of meningitis patients during the first two weeks of the disease and from about 10 per cent. of the people most closely in contact with them. They were frequently present in enormous numbers.

The two cultures isolated from normal students were like meningococci culturally and in their pathogenicity, but did not have the same specific agglutinins.

The finding of meningococci in great numbers in the nasal mucus of such a large proportion of the patients and of those caring for them,

and the absence of meningococci from the nasal mucus of a large number of normal persons examined, would strongly indicate the necessity of isolating cases of epidemic cerebro-spinal meningitis, at least during the early weeks of the disease.

We wish to thank Dr. Park for his constant oversight and direction of our work.

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THE VIABILITY OF TYPHOID BACILLI IN OYSTERS,

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During the past year a series of experiments have been conducted to determine the length of time typhoid bacilli may remain in oysters under market conditions. The oysters were placed in water, which had been previously sterilized, and to which, after sterilization, a certain number of typhoid bacilli were added. The oysters were allowed to remain in this water 24 hours, when they were removed and kept on ice as they are kept under market conditions. Where there were a large number of typhoid bacilli added to the water (50,000 or more per cc.) typhoid bacilli were easily isolated at intervals up to six weeks. At the end of this time, most of the oysters had undergone degenerative changes, and were no longer fit for assimilation. Where the water was infected with a very small number of typhoid bacilli (75 or less to a cubic centimeter) the typhoid bacilli could not be identified owing to the excessive growth or other micro organisms, principally moulds. I infected one set of oysters with B. coli (43 to a cubic centimeter). In this lot of oysters, I could easily determine the presence of bacillus coli, in 1/10 of a cubic centimeter of this juice. They were no longer fit for the market. It would seem, therefore, that there was a possibility of typhoid bacilli remaining in oysters when once infected, even though in small numbers.

I have noticed in a few oysters undergoing degenerative changes that the typhoid bacilli increase rather rapidly. This, however, was not constant. Some of these oysters were still in condition to be sold.

Number of Lot.	Period between Infection and Test.	Number of Organisms in the Normal Oyster Juice per c. c.	Number of Organisms in the Infected Water. (B. Typhosus.)	Number of Organisms per c. c. of Juice of Oysters after Infection.	Number of Colonies Fished.	Percentage of Colonies identified as Typhoid.	Remarks.
IIIa	24 hours	1,500-2,000	250,000,000	1,125,000,000	....	....	
"	6 weeks	....	....	800,000,000	....	....	Plates too crowded to fish.
"	6 "	....	....	75,000,000	60	100	The other oysters had died, and were too dry to test.
IIIb	24 hours	....	50,000,000	93,700,000	60	100	
"	6 weeks	....	....	23,600,000	20	100	
IIIc	24 hours	1,500-2,000	15,000,000	67,500,000	20	100	Others all dead, and too dry to make test.
"	2 weeks	....	....	80,000	20	100	
"	3 "	....	....	20,000	20+	44	
"	3 "	....	....	250	20+	30	
"	4 "	....	....	35,000	20+	70	
"	6 "	....	....	48,000	20+	42	
Lot 2	24 hours	2,500-3,000	10,000,000	8,000,000	20+	36	
"	24 "	....	....	32,000,000	37	100	
"	4 days	....	....	2,572,000	32	100	Oysters dead; very slight change.
"	4 "	....	....	162,400,000	25	60	
"	2 weeks	....	....	4,000,000	25	100	Oysters dead; only sign heart not breathing.
"	2 "	....	....	20,000,000	15	100	
"	3 "	....	....	5,500,000	18	100	Oysters sound; normal.
"	4 "	....	....	5,000	20	88	
"	5 "	....	....	70,000	20	70	
I	24 hours	30,000	500,000	400,000	20	66	
I	5 days	....	....	100,000	....	....	No test for B. Typhosus.

Number of Lot.	Period between Infection and Test.	Number of Organisms in the Normal Oyster Juice per c. c.	Number of Organisms in the Infected Water. (B. Typhosus.)	Number of Organisms per c. c. of Juice of Oysters after Infection.	Number of Colonies Fished.	Percentage of Colonies identified as Typhoid.	Remarks.
Lot 3d.............	24 hours.........	1,500–2,000	64,000	112,500	20	100	No test for B. Typhosus.
“	2 weeks.........	....	....	92,000	50	58	
“	3 “	....	....	78,000	30+	47	
“	4 “	....	....	121,000	25+	75	
“	5 “	....	....	74,000	25+	61	No oysters living at the end of this period.
“	6 “	....	....	41,000	25+	23	
Lot 4...............	24 hours.........	3,000–16,000	73	2,500	50	....	
“	24 “	....	....	20,000	50	....	
“	24 “	....	....	No B. Typhosus	found at any time in 24 hours.		
Lot 5...............	24 “	6,000–7,000	52	“ “	“ “ “ 18 “		
Lot 6...............	24 “	2,000–21,000	61	“ “	could be isolated in 20 oysters.		
Lot 7...............	24 “	2,800	43 Colon B.	2,300	Coli in 1/10 of a c. c.		
“	5 days..........	2,800	....	2,900	“ “ “		
“	12 “	....	....	3,100	“ “ “		
“	2 weeks.........	....	....	3,400	“ “ “		
“	18 days..........	....	....	1,400	“ “ “		
“	21 “	....	....	1,800	“ “ “		
“	24 “	....	....	1,700	“ “ “		
“	28 “	....	....	2,400	“ “ “		
“	31 “	....	....	2,450	“ “ “		
“	38 “	....	....	2,000	“ “ “		

A COMPARATIVE STUDY OF ACCURATE AND ROUGHLY ESTIMATED DILUTIONS OF DRIED BLOOD IN THE TEST FOR SUSPECTED TYPHOID FEVER.

By Anna I. Von Sholly, M. D.,

Assistant Bacteriologist, Research Laboratory.

During October, November and part of December, 1905. all of the dried specimens sent in for the Widal test for typhoid, which were reported positive by the diagnostician at the laboratory at Fifty-fifth street, were sent to us daily for corroboration. The object here was to make as accurate dilutions as possible in order to discover how much discrepancy existed between the results so obtained, and those obtained by the rough dilutions used in the usual routine examination. Our technique was as follows:

The dried blood was carefully scraped from the slide into a small vial of known weight, and weighed on an analytical balance. Previously by experiment, we found that about 70 per cent. in weight was lost by the fresh drop of blood in drying, irrespective, after 24 hours, of the length of time dried. To the weight of the estimated fresh drop of blood was added the necessary weight of sterile distilled water to make the dilution required. The water was measured by means of fine capillary pipettes, the drops from which were found by experiment to be of constant weight. On account of the minute quantity of the materials dealt with, we were compelled to use hanging drop rather than test tube reactions.

The organism used was the so-called Pfeiffer bacillus, which was obtained from Prof. Pfeiffer ten years ago, and is peculiarly adapted for agglutination work on account of its sensitiveness to reactions. A 24-hour broth culture diluted one-half with sterile 8/10 per cent. salt solution was used after the first week, as it was found with this we got the best results. During the first month, we did not systematically test with the paratyphoid bacillus, as we had some difficulty in getting organisms which did not agglutinate spontaneously. We finally after transferring daily for some time, got two strains of paratyphoid—Normach and Buxton, which were satisfactory. In all there were 166 specimens of blood examined, of which 131 were positive and 35 negative. Among

the negative, we include not only those where there was no agglutination, but also those which gave only a marked tendency in 1:25 dilution. The hanging drops were examined at the end of one-half hour, one hour and two hours respectively, and the reading in the table is that of the highest degree of agglutination, usually at the end of two hours. The symbols used to designate the degree of reaction are those commonly used by us in agglutination work, viz: + + complete reaction, +| very good agglutination, + good, ± marked tendency, | slight and — no agglutination.

The reactions obtained at the diagnostic laboratory were not sent down to us until after the readings were made.

The following table which gives part of our results will serve to show the results obtained by the two methods. On comparing the results obtained by the two methods of dilution, one is struck by the surprising accuracy of the rough test. Out of the 166 specimens of blood examined, there were only seven negative results obtained by the process of accurate dilutions by weight against the positive results reported at the Fifty-fifth Street Laboratory. All of the specimens sent down as "negative," were corroborated by us.

Number.	Diagnosis.	Duration.	Reaction at 55th Street.	Typhoid (Pfeiffer)						Paratyphoid.			
										Nornach.		Buxton.	
				1 to 25	1 to 50	1 to 100	1 to 200	1 to 400	1 to 800	1 to 25	1 to 50	1 to 25	1 to 50
Nov. 21, 1905													
" 1, "	....	10 days	+	++	+	±	—	—	..	—	..	—	..
" 2, "	Remittent Fever..	8 "	+	+	+1	+1	+	+	±	1	—	±	1
" 13, "	Typhoid.........	7 "	+	+1	++	+	—	—	..	—	..	—	..
" 14, "	....	14 "	+	+	±	—	—	..	..	—	..	—	..
" 16, "	....	8 "	+	1	—	—	—	..	..	—	..	—	..
Nov. 23, 1905													
" 4, "	Typhoid.........	2 weeks	+	+1	+	±	—	—	..	—	..	—	..
Nov. 24, 1905													
" 8, "	Typhoid.........	14 days	+	+	+	+	±	—	—	1	1	+	±
" 10, "	Typhoid.........	10 "	+	+	+	..	+	±	—	—	—	—	—
" 13, "	....	21 "	+	+	1	—	—	..	..	+	—	—	—
Nov. 27, 1905													..
" 10, "	Paratyphoid.....	4 weeks	+	+	±	1	—	—	..	—	— 1-100	—	— 1-100
" 12, " (16 Nov. 21)....	Typhoid.........	3 "	doubt-ful	1	—	—	—	..	..	—	..	—	..
" 14, "	Typhoid.........	12 days	+	+1	+	±	—	—	..	1	—	—	—
" 16, "	....	2 weeks	+	+1	+	±	1	—	..	1	—	—	—
Nov. 29, 1905													
" 17, "	{ Malaria, No. 16 Nov. 20...... }	....	—	—	—	—	..	..	..	—	..	—	..

Number.	Diagnosis.	Duration.	Reaction at 55th Street.	Typhoid (Pfeiffer).						Paratyphoid. Nornach.		Paratyphoid. Buxton.	
				1 to 25	1 to 50	1 to 100	1 to 200	1 to 400	1 to 800	1 to 25	1 to 50	1 to 25	1 to 50
Dec. 1, 1905													
" 8, "	....	12 days	+	..	+	±	1	—	—	—	..	—	•
" 21, "	Typhoid relapse..	42 "	+	..	+	±	±	—	—	—	..	—	..
" 28, "	....	7 "	+	1	1	—	—	..	..	—	..	—	..
" 29, "	....	7 "	+	++	++	+	±	±	1	—	..	—	..
Dec. 5, 1905													
" 7, "	....	2 weeks	+	++	++	+	±	1	—	—	—	±	1
" 20, "	Typhoid..........	10 days	+	±	1	—	—	..	..	—	..	—	..
Dec. 6, 1905													
" 8, "	....	9 days	+	++	++	++	+1	+	1	—	—	±	1
" 14, "	....	5 "	+	++	+	—	—	..	..	—	—	1	—
" 16, "	Typhoid..........	8 "	+	++	++	+	1	—	..	—	—	+	1
Dec. 11, 1905													
....	Typhoid..........	3 weeks	+	±	+	±	1	—	—	—	—	±	..
....	Typhoid..........	9 days	+	++	++	+1	+	1	1	—	—	±	..
....	....	11 "	+	++	+1	+1	±	1	—	—	—	—	..

REPORT OF BACTERIOLOGICAL EXAMINATION OF WATER SPECIMENS FOR THE YEAR 1905.

By Mary E. Goodwin M. D.,

Bacteriologist, Research Laboratory.

Croton tap water at East Sixteenth street was plated in agar and tested for the presence of colon bacilli once a week during the year. The colony count at 37 degrees and 24 degrees was as follows:

	1 c. c. Plated in Agar at 37° for 24 Hrs.	At 24° for 72 Hrs.	Quantity of Water Containing Colon Bacilli as Shown by the Presumptive Test.
January 3	50 colonies	1,624 colonies	1 c. c.
" 10	70 "	3,760 "	1 "
" 17	60 "	1,992 "	10 "
" 24	76 "	....	....
February 16	14 "	324 colonies	10 c. c.
" 22	25 "	1,600 "	1 "
" 28	18 "	928 "	10 "
March 7	19 "	528 "	10 "
" 14	148 "	7,000 "	10 "
" 22	85 "	1,500 "	10 "
" 28	82 "	792 "	1 "
April 6	40 "	480 "	10 "
" 12	....	856 "	10 "
" 19	23 colonies	200 "	10 "
" 26	30 "	9,000 "	10 "
May 2	29 "	489 "	10 "
" 9	108 "	424 "	10 "
" 16	56 "	175 "	10 "
" 23	162 "	460 "	10 "
" 30	15 "	235 "	1 "
June 6	28 "	600 "	10 "
" 13	36 "	150 "	0.1 "
" 20	60 "	278 "	1 "
" 29	108 "	416 "	0.1 "
July 5	425 "	624 "	1 "
" 11	154 "	330 "	1 "
" 19	16 "	100 "	1 "

	1 c. c. Plated in Agar at 37° for 24 Hrs.	At 24° for 72 Hrs.	Quantity of Water Containing Colon Bacilli as Shown by the Presumptive Test.
July 25	3,040 colonies	9,100 colonies.	0.1 c. c.
August 1	125 "	140 "	1 "
" 8	56 "	112 "	0.1 "
" 15	143 "	199 "	0.1 "
" 22	125 "	135 "	0.1 "
" 29	200 "	236 "	0.1 "
September 6	88 "	160 "	*0.01 "
" 14	420 "	890 "	*0.01 "
" 20	320 "	150 "	0.1 "
" 27	108 "	300 "	0.1 "
October 3	190 "	630 "	*0.01 "
November 14	170 "	550 "	1 "
" 22	150 "	1,300 "	0.1 "
" 28	350 "	2,530 "	0.1 "
December 5	160 "	9,000 "	10 "
" 12	470 "	6,480 "	1 "
" 27	470 "	20,000 "	1 "

* Specimens taken from tank on roof.

During the year three trips were made to the Croton water shed to investigate the possible sewage contamination of the streams entering into Croton lake, and the condition of Croton lake.

At all times the sewage of Mt. Kisco was found to enter almost directly into Branch Brook, which enters into Croton lake by way of Kisco river. The water at the surface of the lake contained fewer bacteria to the c.c. than did the water at the outlet where more of the sediment was present.

On June 24, the following specimens were taken from the Croton water shed:

No. 1—The filtrate from Mt. Kisco sewer beds.

No. 2—Hotel and storm drain.

No. 3—Branch brook below drain.

No. 4—Kisco river.

No. 5—Brook from Italian settlement.

No. 6—Croton dam surface water.

No. 7—Croton lake outlet.

1 c.c. Plated in Agar.	At 37° 24 Hours.	At 24° 72 Hours.
No. 1	125,000 colonies	350,000 colonies.
No. 2	Plates uncountable	Plates uncountable.
No. 3	4,080 colonies	22,600 colonies.
No. 4		2,472 "
No. 5	60,000 colonies	190,000 "
No. 6	668 "	2,400 "
No. 7		11,340 "

Glucose Peptone Water Fermentation Tubes.

	Reaction.	Gas.	Per Cent.	Proportion.
No. 1–1/200 c.c. Colon bacilli isolated.	Acid.	+	35	30% CO_2 H present.
No. 2–1/100 c.c. Colon bacilli not isolated.	"	+	25	35% CO_2 H present.
No. 3–1/100 c.c. Colon bacilli isolated.	"	+	5	30% CO_2 H present.
No. 4–1/100 c.c. Colon bacilli isolated.	"	+	20	20% CO_2 H present.
No. 5–1/200 c.c. Colon bacilli isolated.	"	+	30	30% CO_2 H present.
No. 6–1/100 c.c. Colon bacilli isolated.	"	+	25	35% CO_2 H present.
No. 7–1/50 c.c. Colon bacilli isolated.	"	+	20	20% CO_2 H present.

In addition to the analyses given above, examinations were made of 17 specimens of filtered Croton water from different hospitals, 36 specimens of Croton tap water from different parts of the city and 39 specimens of water from Brooklyn.

METHODS EMPLOYED IN DISINFECTION.

Robert J. Wilson, M. D.,

Assistant Director.

For house disinfection formaldehyde has been used to the exclusion of all other gases. In most instances it has been generated by pouring a mixture of 40 per cent. formaldehyde and aluminum sulphate on quick lime.

This method, which has been under observation for two years has given satisfaction. To get uniform results with certainty, it is necessary that the materials used must be selected by competent persons, and that the preparation of the formaldehyde mixture be under the direction of a skilled assistant.

In this department every consignment of formaldehyde solution is tested for its formaldehyde strength.

Before the solution and lime are sent to the disinfectors they are thoroughly tested, and an experimental mixture made; if there is evidence of formaldehyde or its polymers left in the materials they are not put out.

Frequent inspections are made both during and immediately after disinfection for the purpose of examination of the materials used.

The most valid objection to this method is the fact, that in the event of poor materials or the wrong proportions being used there is polymerization of the formaldehyde, and it is not available as a disinfectant. Acrose seems to be the most frequent product of polymerization when the method is used, and as it gives a red color to the lime, the intensity of this color is an indicator of how much gas has been polymerized in the mixture. If the disinfection process has been successful the slacked lime will be pure white.

The bacteriological testing of disinfection in rooms from which goods are to be removed has been made general, and the results shown by the tests are gratifying. In addition to this the card, with its information, to which the test thread was attached, is filed in a card index and can be referred to at any time if it is necessary to determine at what time the room was opened or at what particular hour of the day the disinfection took place.

The general disinfection at the contagious disease hospitals, the ambulance and disinfecting stations and the conveyances carrying contagious diseases is the same as detailed in my last report. At Riverside Hospital the laundry, which was formerly sterilized by passing through a high-temperature water seal, is now sterilized in the autoclave at the disinfecting station of the hospital

Methods Employed in Cleaning Public Schools, Street Cars, etc., in New York City.

In schools the nature of the cleaning is for the most part uniform. After the classes have been dismissed for the day the windows are opened and the cleaners proceed to sweep the rooms with ordinary brooms, no special attempt being made to keep the dust down. There are exceptions to this in a few instances where damp sawdust is used or the floors sprinkled with water. In the morning before the children assemble the rooms are dusted; the teachers' desk and chair and the woodwork of the walls being wiped with a cloth duster, the children's desks and seats being dusted with a feather duster.

Twice a year the school rooms are thoroughly scrubbed with soda solution.

In theatres ordinary brooms were used for sweeping between the seats, and hair brooms on the smooth floors. In some instances during the sweeping process all of the seats were covered over with special covers, which were removed after the cleaning process was over. The woodwork was wiped with cloth dusters, while feather dusters were used for the walls and places not easily reached.

Street cars were cleaned under a system which is about as follows: When the car enters the building where it is to be cleaned, it is immediately visited by the cleaners who remove the mats and sweep the car. As soon as the car is swept the cleaners wash the windows inside and out, following which all of the woodwork of the car is dusted with cloth dusters, waste being used for this purpose.

In tenement houses the hallways were swept with ordinary brooms, and in about nine-tenths of the cases, feather dusters were used in dusting. Where cloth dusters were used it was generally the habit of

the cleaners to use the same duster for all floors; this duster was used dry and shaken from the windows as the cleaners passed from floor to floor. There was a very great accumulation of dust and dirt in the hallways of some of these houses, having its source in the rooms of the tenants, who swept the dirt from their rooms directly into the main hall.

In the better class of apartments, sweeping was done with hair brooms, and the stairs and floors were washed daily with either soda or soap solution. Cloth dusters were used to wipe the woodwork.

Two club houses were visited; in one instance sweeping was done with ordinary brooms and dusting with feather dusters, in the other a combination of ordinary and hair brooms and a sweeping machine was used for sweeping, and the furniture and woodwork was wiped with damp cloths.

In the hospitals visited, sweeping was done with hair brooms, some of which were covered with cheese cloth, dusting was done with cloth dusters.

Railroad coaches were dry swept with ordinary brooms; following sweeping, the windows were cleaned inside and out. Cloth dusters were used to dust the woodwork.

In sleeping cars all of the removable upholstering was taken from the car to a special platform where it was thoroughly cleaned by compresssed air. The interior of the car was swept with ordinary brooms and scrubbed with soap solution, the woodwork was wiped over with a special dressing material to keep its appearance good.

The floors of ferryboats were generally wiped with wet mops, and the dusting was done with a combination of cloth and feather dusters. Ferry houses were swept with ordinary brooms, in some instances the floors being first covered with wet saw-dust and in others sprinkled with water, in dusting both cloth and feather dusters were used.

In churches before cleaning was commenced the cushions on the seats were turned upside down. Sweeping was done with ordinary brooms, hair brooms and sweeping machines. The dusting was done with feather dusters and damp cloths and dry cloths.

VIABILITY OF TUBERCLE BACILLI IN DRIED SPUTUM.

By Anna I. Von Sholly, M. D.,

Assistant Bacteriologist, Research Laboratory.

With fresh sputum proved by microscopical examination to contain a very large number of tubercle bacilli, a test was made to determine their viability when the sputum was dried in the dark and in diffuse daylight. Glass and gauze were the media inoculated with the sputum.

As controls, five healthy guinea pigs, each about 250 gms. in weight, were inoculated with the fresh sputum, four intraperitoneally with 1/100 c.c., 1/1,000 c.c., 1/10,000 c.c., 1/100,000 c.c., respectively, and one subcutaneously with 1/1,000 c.c. Successive batches of guinea pigs of uniform medium size were then inoculated intraperitoneally with emulsions made from this sputum dried at room temperature, one series dried in diffuse light and one in the dark, for 24 hours, 3 days, 9 days, 16 days, 34 and 35 days and 62 and 66 days respectively. The pigs that did not die were killed and autopsied after 72 to 150 days, and their lesions noted. As the time of drying became greater the dose given the animals was progressively increased up through 1/100 c.c., 1/10 c.c, ½ and 1 c.c.

Of the five original control animals, two killed after 107 days, showed typical lesions and tubercle bacilli; the two which died after 23 days did not present typical tuberculosis nor were bacilli found. One of these latter was the one inoculated subcutaneously and the other had the smallest dose, viz.: 1/100,000 c.c. One pig disappeared. Of the 3 pigs inoculated after 24 hours drying on glass, from the one dying at end of 34 days from 1/100 c.c. dose, tubercle bacilli were recovered. Two died of accident and cannot be considered in the experiment. Three pigs were inoculated with the sputum dried on gauze for three days in the dark. Two of these receiving 1/100 c.c and 1/1,000 c.c., respectively, showed tuberculous lesions at autopsy, which were confirmed by finding the bacilli. The pig receiving 1/10,000 c.c. was negative.

At the same time three pigs were injected with emulsions from impregnated gauze dried three days in the light, but one pig disappeared and two met with accidents again. Four of the six pigs inoculated with emulsions from gauze dried 9 days (3 bits of gauze dried in dark and 3 dried in light) showed tuberculous lesions confirmed bacteriologically. Two pigs died of accident, one from each series dried in light and dark.

Of the nine pigs inoculated after 16 days drying in gauze in the dark and in the light, and on glass in the light, 5 showed lesions which were corroborated and 4 did not. These were all killed on 106th to 131st day. Of the 5 tuberculous pigs, 1 was given 1/100 c.c. sputum dried on gauze in the dark, one ½ c.c. dried in the dark on gauze, one ½ c.c. dried in gauze in the light, and two 1/100 c.c. and ½ c.c. each of sputum dried on glass in the light.

None of the pigs injected on the 34th, 35th 62d and 66th days with sputum dried either on glass or gauze, showed tuberculous lesions.

	Fresh Sputum.	Sputum Dried 24 Hours.	Sputum Dried 3 Days.	Sputum Dried 9 Days.	Sputum Dried 16 Days.	Sputum Dried 34-35 Days.	Sputum Dried 62-66 Days.
Number of pigs inoculated.....	4	1	3	6	9	8	5
Pigs showing tuberculous lesions.........	2 killed in 107 days.	1 died in 34 days.	2 { 1 died in 32 days. 1 killed in 72 days.	4 { 1 died in 24 days. 3 killed in 104 days.	5 killed in 106 to 130 days.	0	0
Pigs showing no tuberculous lesions.........	2 died in 23 days.	0	1 killed in 145 days.	2 { 1 died in 4 days. 1 died in 5 days.	4 killed in 106 to 131 days.	8 killed in 113 to 151 days.	5 killed in 117 to 123 days.

DEPARTMENT OF HEALTH,
CITY OF NEW YORK,
S. W. COR. 55TH STREET & SIXTH AVENUE,
BOROUGH OF MANHATTAN,
NEW YORK, March 3, 1906.

To the Board of Health,
Department of Health,
City of New York:

GENTLEMEN—I have the honor to transmit the report of the Bureau of Records for the year 1905.

POPULATION.

The State Census taken in June, 1905, gave to the Greater City a population of 4,014.304, distributed among the boroughs as follows:

Manhattan	2,112,697
The Bronx	271,629
Brooklyn	1,358,891
Queens	198,241
Richmond	72,846

GENERAL STATISTICS.

Births.

There were 103,880 births reported during the year as compared with 99,555 reported during 1904, an increase of 4,325, distributed among the boroughs as follows:

Manhattan	1,006
The Bronx	626
Brooklyn	2,113
Queens	484
Richmond	96

The following table gives the number of births and birth-rates in the boroughs and City since 1898, the year in which the Greater City was formed:

Births Reported and Birth Rates by Boroughs and City, 1898-1905.

Borough.	1898.		1899.		1900.		1901.		1902.		1903.		1904.		1905.	
	Number of Births.	Rate.	Number of Births.	Rate.	Number of Births.	Rate.	Number of Births.	Rate.	Number of Births.	Rate.	Number of Births.	Rate.	Number of Births.	Rate.	Number of Births.	Rate.
Manhattan	49,835	27.54	48,397	26.44	50,494	27.23	49,990	26.25	52,291	26.74	56,078	27.93	59,196	28.71	60,202	28.43
The Bronx	3,524	21.07	3,671	19.96	4,122	20.45	4,023	18.79	5,220	22.94	6,053	25.03	6,033	23.48	6,659	24.39
Brooklyn	21,395	19.54	21,203	18.73	22,572	19.34	22,182	18.40	23,507	18.91	27,292	21.29	28,859	21.89	30,972	22.73
Queens	2,826	20.62	2,943	20.27	3,084	20.07	3,127	19.32	3,198	18.76	3,802	21.18	3,871	20.48	4,355	21.87
Richmond	1,348	21.14	1,418	21.67	1,449	21.59	1,413	20.71	1,428	20.58	1,530	21.68	1,596	22.25	1,692	23.19
City of New York	78,928	24.12	77,632	23.13	81,721	23.71	80,735	22.72	85,644	23.36	94,755	25.06	99,555	25.52	103,880	25.81

From the above it will be seen that the rate has risen gradually from the year of consolidation; the true rate in the entire city approximates 30 per 1,000, in other words over 16,000 births escape registration, and the Registrar lays special stress upon the necessity of the recording all births occurring in the City in order that children may produce evidence of age requisite for admission into school and for obtainment of employment certificates between ages of fourteen to sixteen years. A large number of births are not recorded in cases where no physician or midwife is in attendance, and a still larger number fail of record by reason of the negligence of the attending physician or midwife.

Marriages.

The number of marriages reported during the year was 42,671 as against 39,436 during 1904, an increase of 3,235, distributed among the boroughs as follows:

Manhattan	1,908
The Bronx	355
Brooklyn	759
Queens	171
Richmond	42

The following table shows the number of marriages reported and the rate per 1,000 in the boroughs and City since 1898:

Marriages Reported and Marriage Rates by Boroughs and City, 1898-1905.

Borough.	1898.		1899.		1900.		1901.		1902.		1903.		1904.		1905.	
	Number of Marri-ages.	Rate.	Number of Marri-ages.	Rate.	Number of Marri-ages	Rate.	Number of Marri-ages.	Rate.	Number of Marri-ages.	Rate.	Number of Marri-ages.	Rate.	Number of Marri-ages.	Rate.	Number of Marri-ages.	Rate.
Manhattan	20,118	11.12	20,836	11.36	21,979	11.85	22,895	12.02	24,766	12.67	25,911	12.90	26,500	12.85	28,408	13.42
The Bronx	651	3.89	904	4.92	948	4.69	1,067	4.80	1,227	5.03	1,354	4.76	1,465	4.97	1,820	6.67
Brooklyn	7,129	6.51	7,612	8.48	8,214	7.04	8,303	6.89	9,014	7.25	9,616	7.50	10,019	7.61	10,778	7.91
Queens	636	4.64	710	4.89	768	5.00	777	4.80	768	4.51	855	4.76	921	4.87	1,092	5.48
Richmond	351	5.50	412	6.30	428	6.38	405	5.93	432	6.23	438	6.21	531	7.40	573	7.86
City of New York	28,885	8.83	30,474	9.07	32,247	9.36	33,447	9.41	36,207	9.88	38,174	10.10	39,436	10.11	42,671	10.60

Deaths.

There were 73,714 deaths reported during the year, against 78,060 during 1904—a decrease of 4,346, distributed among the boroughs as follows:

Manhattan	2,655
The Bronx	889
Brooklyn	896
Richmond	64

Queens was the only borough that showed an increase (158).

The following table gives the death-rates by boroughs and city since 1898. It will be noticed that the rate for the entire city is very low, being the second lowest since the formation of the Greater City; further on the decrease from that of last year will be entered into more minutely:

Boroughs.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.
Manhattan	20.28	19.77	20.97	20.22	18.80	18.43	20.53	18.74
The Bronx	22.42	20.23	21.58	22.40	21.69	19.70	24.98	20.25
Brooklyn	19.77	19.13	20.15	19.30	17.97	17.27	18.83	17.57
Queens	18.69	17.29	17.96	17.30	16.32	14.90	16.04	16.03
Richmond	20.48	19.45	20.53	19.71	18.48	17.29	20.25	19.04
City of New York	20.26	19.47	20.57	19.90	18.58	17.95	20.01	18.32

The following table gives the corrected inter-borough deaths and death-rates per 1,000 during 1905; the correction in some of the boroughs is considerable, especially in the Borough of The Bronx, in which are situated several large hospitals, the majority of whose patients are recruited from residents of the Borough of Manhattan.

Corrected Deaths and Death Rates Among the Boroughs, Year 1905.

	Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	Total.
Manhattan	....	221	365	58	22	666
The Bronx	1,449	....	48	8	4	1,509
Brooklyn	112	1	....	56	5	174
Queens	78	1	90	....	....	169
Richmond	97	2	25	....	....	124
Total	1,736	225	528	122	31	2,642
Death rate corrected	19.24	15.55	17.83	15.84	17.77	18.32

The following table gives the death rates of the former City of New York (present Boroughs of Manhattan and The Bronx) and the former City of Brooklyn (present Borough of Brooklyn) from 1866 to date.

The Metropolitan Board of Health was organized in 1866, and had jurisdiction over the two cities conjointly for four years, and after 1870 over the old City of New York singly, the City of Brooklyn having a separate head until January 1, 1898, when consolidation took place.

In 1866 the death rate in The City of New York was 34.92 per 1,000, in 1905, 18.91 per 1,000, a decrease of almost 46 per cent., so that if the rate of 1866 prevailed in the past year it would represent a total number of 73,939 deaths in the territory covered by the old city in lieu of 45,199, a saving of 28,740 lives. If we apply the same reasoning to the present Borough of Brooklyn, there would be a decrease in the rate of 36 per cent., and a saving of 13,543 lives; if we go a step further and apply the death rate of the old City of New York in the year 1866 to the population of the entire city in 1905, it would mean a saving of 66,831 lives.

General Death Rate Per 1,000, *Old City of New York,* 1866-1905.

Year.	Death-Rate.	Year.	Death-Rate.	Year.	Death-Rate.	Year.	Death-Rate.
1866..........	34.92	1876..........	27.11	1886..........	25.99	1896..........	21.84
1867..........	28.65	1877..........	23.66	1887..........	26.32	1897..........	20.03
1868..........	29.25	1878..........	23.68	1888..........	26.39	1898..........	20.46
1869..........	28.09	1879..........	24.13	1889..........	25.32	1899..........	19.81
1870..........	28.81	1880..........	26.41	1890..........	24.87	1900..........	21.03
1871..........	28 22	1881..........	31.04	1891..........	26.31	1901..........	20.45
1872..........	33.70	1882..........	29.61	1892..........	25.95	1902..........	19.11
1873..........	29.63	1883..........	25.80	1893..........	25.30	1903..........	18.57
1874..........	27.87	1884..........	25.82	1894..........	22.76	1904..........	21.02
1875..........	29.40	1885..........	25.55	1895..........	23.18	1905..........	18.91

General Death Rate Per 1,000, *City and Borough of Brooklyn,* 1866-1905.

Year.	Death-Rate.	Year.	Death-Rate.	Year.	Death-Rate.	Year.	Death-Rate.
1866..........	27.51	1876..........	24.69	1886..........	22.70	1896..........	21.79
1867..........	25.09	1877..........	22.02	1887..........	23.33	1897..........	19.40
1868..........	24.69	1878..........	20.79	1888..........	21.23	1898..........	20.01
1869..........	23.32	1879..........	21.03	1889..........	23.63	1899..........	19.10
1870..........	24.02	1880..........	23.27	1890..........	24.53	1900..........	20.10
1871..........	24.82	1881..........	24.79	1891..........	25.62	1901..........	19.30
1872..........	24.76	1882..........	24.81	1892..........	24.23	1902..........	17.97
1873..........	24.52	1883..........	22.03	1893..........	23.74	1903..........	17.27
1874..........	23.66	1884..........	21.90	1894..........	21.95	1904..........	18.83
1875..........	25.78	1885..........	23.10	1895..........	22.67	1905..........	17.57

The following table shows the number of deaths from the principal causes in the entire city during the year and compares the mortality of 1905 with that of 1904, indicating the increases and decreases:

Cause of Death.	1904.	1905.	Increase in 1905.	Decrease in 1905.
Typhoid fever..................................	661	649	....	12
Malarial fever..................................	91	53	....	38
Smallpox..................................	7	9	2	....

Cause of Death.	1904.	1905.	Increase in 1905.	Decrease in 1905.
Measles	895	520	....	375
Scarlet fever	851	473	....	378
Whooping cough	197	408	211	....
Diphtheria and croup	2,084	1,544	....	540
Influenza	501	311	....	190
Dysentery	184	149	....	35
Pulmonary tuberculosis	8,512	8,535	23	....
Other tubercular diseases	1,176	1,123	....	53
Cancer, sarcoma	2,709	2,875	166	....
Diabetes	549	589	40	....
Alcoholism	665	596	....	69
Diseases of nervous system	6,959	7,501	542	....
Diseases of circulatory system	6,251	6,437	186	....
Bronchitis, acute and chronic	2,159	1,732	....	427
Pneumonia (lobar and broncho)	12,369	9,783	....	2,586
Diarrhœal diseases (under two years)	5,647	5,877	230	....
Diarrhœal diseases (two years and over)	880	754	....	126
Other diseases of digestive system	2,994	3,109	115	....
Bright's disease and acute nephritis	6,220	5,944	....	276
Puerperal diseases	737	815	78	....
Congenital debility and malformations	3,742	4,019	277	....
Old age	933	723	....	210
Homicides	176	165	....	11
Suicides	853	660	....	193
Accidents	4,162	3,651	....	511
Ill defined causes	1,138	1,092	....	46
All other causes	3,758	3,618	....	140
Total	78,060	73,714	1,870	6,216
Balance	4,346		4,346	

The following table makes a comparison between the mortality by the sexes and ages, during the years 1904 and 1905. It shows that of the 4,346 decrease compared with last year that 2,272 was among the males and 2,074 among the females; and that the decrease was greater among the females before 25 years and over 65 years; and that the decrease occurred at all ages of life:

Comparative Mortality by Sex and Age, 1904-1905.

	Under 5 Years.		5 to 25		25 to 45		45 to 65		65 and over.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
1904	13,724	11,818	4,348	4,369	10,032	6,907	9,122	6,799	5,151	5,790
1905	13,315	11,224	3,990	3,813	9,298	6,504	8,540	6,496	4,962	5,572
Decrease....	409	594	358	556	734	403	582	303	189	218

Typhoid Fever.

There were 12 less deaths reported from this disease than in the previous year; decreases were noted in Manhattan (4), Brooklyn (6), Queens (3) and Richmond (4), the only borough showing an increase was The Bronx (5). The death rate per 100,000 of the population was 16.12 for 1905, and 16.94 for 1904; this rate is considerably lower than almost all the large cities in the country but compares unfavorably with some of the large foreign cities, for instance, the rates per 100,000 in 1904 were as follows: London 6.4, Paris 12.6, Berlin 3.7 and Vienna 3.3.

Much remains to be done in the way of purification of water, milk, fish and fresh vegetable supply before we can hope to attain the almost comparative immunity enjoyed by some of the European cities; that much has been done in the past is evidenced by the great decrease in the rate in the old City of New York since 1873.

The average decennial rates per 100,000 since 1873 in the old City of New York were as follows: 1873-1882, 32.8; 1883-1892, 28.7; 1893-1902, 17.8; the annual rates for the old city for the past three years were, 1903, 15.6; 1904, 13.3 and 1905, 13.0.

Malarial Fevers.

The number of deaths for the year from malarial fevers was 53, a decrease of 38 from that of 1904; for the past three or four years the use by practicing physicians of the Widal and Diazo reactions, as performed free of cost by the Department, has undoubtedly led to the

inclusion of a large number of cases and deaths under the proper heading of typhoid fever, which otherwise would in a majority of instances have been classed under malarial fever.

Smallpox.

There was an increase of two deaths in 1905 over 1904, the figures being respectively 9 and 7.

Measles.

There were 375 less deaths reported for Measles in 1905 than in 1904, and the following table shows the effect of measles upon the deaths from the acute respiratory diseases especially among children; it will be noted that the deaths in March, April and May from bronchitis and broncho pneumonia increased in proportion to the increase in deaths from measles. The steps taken by the Department in 1904 as to the fumigation of apartments will undoubtedly educate the public as to the necessity of extreme care in the treatment of this dangerous disease; it has brought to their minds the error of considering it a harmless disease and of neglecting the calling in of medical advice upon its appearance.

Month.	Deaths from Measles.		Deaths from Broncho-Pneumonia.		Deaths from Acute Bronchitis.	
	1904.	1905.	1904.	1905.	1904.	1905.
January	82	32	524	507	243	173
February	82	25	490	412	201	141
March	130	49	502	474	222	167
April	176	52	561	473	194	170
May	154	66	429	389	159	123
June	98	92	256	303	106	86
July	48	63	209	255	69	76
August	23	33	217	221	56	75
September	21	15	207	177	86	64
October	23	13	267	243	101	85
November	26	40	329	294	132	119
December	32	40	478	378	166	138
Total	895	520	4,469	4,126	1,735	1,417

The decennial death rate per 10,000 of the population in 1875-1884 was 3.64; in 1885-1894 it rose to 4.10, and fell in 1895-1904 to 2.40; the reason of this great decline can be justly attributed to the position taken by the Board in 1896, when it ordered the quarantining of all cases of measles and inaugurated the inspection by physicians of the pupils attending public and parochial schools. This latter step was not taken until October, 1896, so that the effect of this salutary innovation was not felt until 1897, in which year the rate per 10,000 fell from 3.7 in 1896 to 2.0 per 10,000, and since then has not increased beyond 2.4.

Scarlet Fever.

473 deaths were reported from scarlet fever during the year, a decrease of 378; of these 473 deaths, 271 occurred in the Boroughs of Manhattan and The Bronx, the territory that formerly comprised the former City of New York. Compare this with the records for previous years; for instance the year 1873: the number of deaths reported from this disease was 1,045, in 1881 it reached 1,964 and the following year rose to 2,066; in year 1888, 1,361 were reported, and in 1889, 1,242 were registered; the quarantining of this disease began in 1888 with the result that in 1890 the number fell to 408, rose the following year to 1,220 and from that year on it fell to such points that the death rate therefrom never equaled one-half that of 1891. To make it even more obvious, the decennial rate of 1875-1884 was 9.15, in the next decennium it fell to 4.91 and in the past decennium to 2.40 per 10,000 of entire population; if the death rate of the first decennium mentioned be applied to the population of the former City of New York in 1905 it would furnish us with a total of 2,187 deaths, the number actually reported having been 271—a saving of 1,916 lives.

Diphtheria and Croup.

There were 1,544 deaths reported from this disease during the year against 2,084 in 1904, a decrease of 540; the death rate per 100,000 of the population in 1905 was 38.4, against 53.4 in the year previous. This immense decrease in the death rate is attributable solely to the more extensive use of diphtheria antitoxin by the practising physicians of the city; beginning in 1895 the year in which it first came into general

use up to the present day, the record has been one of substantial decrease for every succeeding year with one exception. This wholesale life-saving has not been confined to the limits of our city but has been going on in every country of the globe which has seen the light of medical advance and profited thereby. Attention is directed to the following table, showing the death rate from diphtheria and croup in the former City of New York from 1875 to date, particularly to the decennial rate of 1875-1884 and 1895-1904, a decrease from 176 to 67 per 100,000. The rate for the past year of 36 cannot but fail to impress even the most sceptical that this formerly much dreaded scourge is rapidly being reduced to a minimum as a morbific cause.

Deaths and Death Rates Per 100,000 *of the Population from Diphtheria and Croup—Old City of New York,* 1875-1905.

Year.	Deaths.	Rate.	Decennial Rate.
1875	3,087	296	....
1876	2,277	212	....
1877	1,423	128	....
1878	1,506	132	....
1879	1,193	101	....
1880	2,300	190	176
1881	3,287	264	....
1882	2,254	175	....
1883	1,653	125	....
1884	1,838	135	....
1885	2,180	156	....
1886	2,695	188	....
1887	3,056	207	....
1888	2,553	168	....
1889	2,291	146	....
1890	1,783	111	152
1891	1,970	119	....
1892	2,106	123	....
1893	2,558	146	....
1894	2,870	159	....
1895	1,976	105	....
1896	1,763	91	....

Year.	Deaths.	Rate.	Decennial Rate.
1897	1,590	81	....
1898	923	47	....
1899	1,085	54	....
1900	1,276	62	67
1901	1,227	58	....
1902	1,142	52	....
1903	1,232	55	....
1904	1,272	55	....
1905	860	36	....

Pulmonary Tuberculosis.

8,535 deaths and a death rate of 2.12 per 1,000 were reported from this disease during the year, against 8,512 deaths and a rate of 2.18 per 1,000 in 1904. In the old City of New York the rate for 1905 was 2.38 as compared with 2.38 of 1904. In the Registrar's analysis in the report of 1903 will be found a table giving the annual and decennial death rate from this disease for a period of 33 years, and on page 389 of the report of 1902 will be found an interesting table prepared under the direction of the General Medical Officer giving the deaths, rates, cases reported and specimen of sputum examined for a period of 17 years.

Cancer and Sarcoma.

The deaths from cancer and sarcoma numbered 2,875 during the year, an increase of 166 over the previous year, the rate being 714 in 1905 against 694 per 1,000,000 of population in 1904. In the annual reports of 1903 and 1904 will be found among the Registrar's analysis of the returns, several tables and statements which justify me in repeating the conclusions then drawn that the death rate from cancerous diseases has increased considerably; that this increase has taken place among the internal and inaccessible cancers, and among males rather than females; that it is only partly accounted for by more accurate diagnosis and improved certification; and that the increase is an actual one, probably due to increased consumption of animal food with decreased physical exercise, freer use of alcoholic beverages and tobacco, and gen-

eral wear and tear of the nervous system consequent upon the rapid pace pursued in commercial and social life.

Diseases of the Nervous System, Cerebro-spinal Meningitis.

There were 7,501 deaths reported under the above general heading against 6,959 in 1904, an increase of 542 deaths. This increase is explainable by the continued presence during 1905 of the severe epidemic of cerebro-spinal meningitis which had prevailed during 1904; 622 more deaths were reported from this cause than in the previous year, in which the total number reached 1,403. (Cerebro-spinal meningitis is placed under the Nervous Diseases in the Bertillon classification of Causes of Death). The formation of a commission for the study of this disease was carried into effect and much valuable information collected which shortly will be available to those interested.

In the report of 1904 will be found a valuable table giving the population, number of deaths and death rates per 10,000 of the population from cerebro-spinal, tubercular and simple meningitis in the old City of New York for a period of 39 years.

Circulatory and Urinary Diseases.

The deaths from these diseases are placed together in this commentary because both are often given as causes upon the same certificate of death—it being difficult to determine in many instances to which preference should be given—and both have co-relative anatomical functions, a mutual dependency existing between them.

In 1905 there were 6,437 deaths from diseases of the circulatory system and 5,944 from chronic organic disease of the kidneys, a total of 12,381 deaths (one-sixth of deaths from all causes), against a total of 13,179 from both causes in 1904.

The tendency of the death rate from these two combined causes has been gradually upward since the organization of the Board of Health in 1866. The decennium 1869-1878 in the old City of New York was attended by a death rate from these two causes of 17.13 per 10,000 of population, that of 1879-1888, by one of 20.47 and that of 1889-1898, by one of 24.23, in other words, between the first and last decennium mentioned there has been an increase in the rate of 7.10, or 41 per cent.;

the effect upon heart and Bright's disease of influenza (appearing here first in 1889) is clearly shown in the decennium 1889-1898, the increase amounting to almost 4 points per 10,000 of the population.

Respiratory Diseases.

There were 12,371 deaths reported during the year from all respiratory diseases against 15,440 in 1904, a decrease of 3,069; of this decrease 2,904 occurred in the deaths from acute bronchitis, broncho and lobar pneumonia, in other words the acute respiratory diseases. In the first six months of 1904 a severe epidemic of measles prevailed to such an extent that the deaths from acute bronchitis and broncho pneumonia—two diseases five-sixths of the deaths from which occur in children under five years of age—were appreciably affected thereby as shown in the first of the following tables, from which it is evident that in every month in 1904 during which measles prevailed to a considerable extent the deaths from these two acute respiratory diseases were increased in proportionate degree.

The deaths from lobar pneumonia numbered 5,657 in 1905 as compared with 7,900 in 1904, a decrease of 2,243; this decrease occurred almost entirely in the first five and the last month of the year, and was coincident—save in January—with the decrease in the deaths from influenza; the influence of this latter disease is shown in the second of the following tables. This decrease of 2,243 deaths from lobar pneumonia was distributed between the sexes as follows: Males 1,536, females 707. Almost 70 per cent. of this decrease took place between the ages 25 to 65 years.

Deaths by Months, City of New York, from Measles, Acute Bronchitis and Broncho-Pneumonia.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Measles—													
1904	82	82	130	176	154	98	48	23	21	23	26	32	895
1905	32	25	49	52	66	92	63	33	15	13	40	40	520
	— 50	— 57	— 81	— 124	— 88	— 6	15	10	— 6	— 10	14	8	— 375
Acute Bronchitis and Broncho-Pneumonia—													
1904	767	691	724	755	588	362	278	273	293	368	461	644	6,204
1905	680	553	641	643	512	389	331	296	241	328	413	516	5,543
	— 87	— 138	— 83	— 112	— 76	27	53	23	— 52	— 40	— 48	— 128	— 661

Deaths by Months, City of New York, from Influenza and Lobar Pneumonia.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Influenza—													
1904	70	103	128	87	29	5	1	..	2	1	22	53	501
1905	108	65	56	16	16	6	2	2	2	2	18	18	311
	38	— 38	— 72	— 71	— 71	1	1	2	..	1	— 4	— 35	— 190
Lobar Pneumonia—													
1904	992	1,163	1,265	1,168	705	306	220	187	235	319	565	775	7,900
1905	799	676	643	598	464	283	188	209	219	336	565	677	5,657
	— 193	— 487	— 622	— 570	— 241	— 23	— 32	22	— 16	17	..	— 98	— 2,243

Diarrhoeal Diseases.

6,631 deaths were reported from this class of diseases during 1905, against 6,527 during 1904, an increase of 104 deaths. The death-rate per 1,000 in 1905 was 1.65, and in 1904 was 1.67; the rate from diarrhoeal diseases in children under two years of age was 1.46 per 1,000 in 1905 and 1.45 in 1904. During 1905 greater efforts were put forth than ever before to better the condition of the milk supply to the City and to educate the parents to a better appreciation of the necessity of keeping the milk used for bottle-nursed babies clean and wholesome by sending nurses to visit among the homes considered as needing this instruction; it is disappointing not to find a considerably lowered death-rate from these diseases. The death-rate from all diarrhoeal diseases was 3.61 per 1,000 in 1881 and gradually decreased until it reached its lowest point in 1903 of 1.38, and the efforts put forth by the Department in 1904 and 1905 have not succeeded in producing the effect desired, a lowering of this rate; on the other hand the harder work done in these two years must have availed something, without it the rate may have gone much higher.

Accidental Deaths.

The deaths from accident numbered 3,651 in 1905, against 4,162 in 1904, a decrease of 511 deaths; in 1904 the " Slocum " disaster occurred, by which 914 lives were lost, so that if we omit this number in comparing the two years there would have been an increase of 403 deaths; during 1905 there were 220 deaths reported from sunstroke, against 39 deaths in 1904.

The deaths from accidental causes are much more numerous in our City than in most of the cities of the world; take, for instance, the City of London with a greater population by a half million had in 1903 only 306 deaths from street accidents, whereas in this city there were reported 538 from same causes in 1903 and 709 in 1905.

Suicides.

There was a decrease of 193 suicides in 1905 as compared with 1904, the figures respectively being 660 and 853. Of these 660 suicides 512 were males and 148 females; native Germans furnished 184 and

native Americans 231; illuminating gas was used as a means by 148, gunshot by 206, carbolic acid by 89, and hanging by 84 persons.

Searches and Transcripts.

During 1905 there were 88,395 searches made of the records of births, marriages and deaths against 68,824 during 1904, an increase of 19,571 or 28 per cent. This increase was confined chiefly to searches of the records of birth of children anxious to obtain admission into the public schools or employment certificates; in the Borough of Manhattan alone 26,176 searches were made of the records of birth and certificates issued without cost to parents or children. The number of transcripts or certified copies of the records amounted to 35,833 in the entire City, a decrease of 635 from that of 1904, due to lessened mortality during 1905, thereby decreasing the demand for transcripts of certificates of death.

Respectfully submitted,

William H. Guilfoy, M. D.,
Registrar of Records.

REPORT OF BUREAU

For Year Ending

	Borough of	
	Manhattan.	*The Bronx.
Number of deaths	39,671	5,528
Death rate	18.74	20.25
* Corrected death rate	19.24	15.55

* This means that the death rate in each borough is corrected by the exclusion of deaths occurring in other boroughs.

Borough.	Estimated Population.	Certificates Received and Tabulated.			
		Marriages.	Births.	Deaths.	Still-births.
Manhattan	2,117,375	28,408	60,203	39,671	3,660
The Bronx	273,007	1,820	6,659	5,528	310
Brooklyn	1,362,352	10,782	30,972	23,935	1,991
Queens	199,099	1,092	4,355	3,191	284
Richmond	72,947	573	1,692	1,389	107
City of New York	4,024,780	42,675	103,881	73,714	6,352

	Borough of	
	Manhattan.	The Bronx.
Number of deaths in institutions	13,921	2,289
Number of deaths in tenements	22,506	1,784
Number of deaths in dwellings	1,858	1,264
Number of deaths in hotels and boarding-houses	482	26
Number of deaths in streets, rivers, etc	904	165

OF RECORDS,

December 31, 1905.

Borough of			City of New York.
Brooklyn.	Queens.	Richmond.	
23,935	3,191	1,389	73,714
17.57	16.03	19.04	18.32
17.83	15.84	17.77	18.32

of residents of other boroughs occurring within its limits, and by the inclusion of deaths of its residents

Rate per 1,000.				Transit Permits Issued.	Coroners' Cases.	Searches Made.	Transcripts Issued.
Marriages.	Births.	Deaths.	Still-births.				
13.42	28.43	18.74	1.73	934	5,791	51,452	21,258
6.67	24.39	20.25	1.14	37	771	3,581	2,149
7.91	22.73	17.57	1.46	429	3,342	31,123	10,825
5.48	21.87	16.03	1.43	245	611	1,465	959
7.86	23.19	19.04	1.47	....	204	774	642
10.60	25.81	18.32	1.58	1,645	10,719	88,395	35,833

Borough of			City of New York.
Brooklyn.	Queens.	Richmond.	
5,225	505	506	22,446
11,575	691	117	36,673
6,576	1,798	685	12,181
114	64	15	701
445	133	66	1,713

Particulars Regarding Births, Deaths, Marriages and Still-births Reported during the Year ending December 31, 1905.

CITY OF NEW YORK.

	*Marriages.		*Births.		Deaths.		Still-births.	
	M.	F.	M.	F.	M.	F.	M.	F.
White	41,313	41,323	52,104	50,020	39,059	32,600	3,518	2,571
Colored	1,343	1,350	891	862	982	1,002	107	102
Chinese	19	2	4	......	66	5	......	......
Native parents	......	......	14,573	13,652	8,014	7,278	1,009	802
Foreign parents	......	......	31,239	30,268	25,182	21,157	1,980	1,931
Parentage of mixed nativities	......	......	6,664	6,432	3,635	3,199	393	274
Parentage unknown or not stated	......	......	523	530	3,276	1,973	242	207
Single	38,225	38,490	......	......	22,833	16,791	......	......
Married	......	......	......	......	12,741	9,360	......	......
Widowed	4,173	3,731	......	......	3,962	7,315	......	......
Divorced	278	454	......	......	43	28	......	......
Not stated	......	......	......	......	528	113	......	......
Total	42,675		103,881		73,714		‖6,352	
Month of utero-gestation... 1							......	
2							29	
3							119	
4							254	
5							477	
6							733	
7							948	
8							792	
9							2,747	
10							216	
Not stated							37	

* The returns of Births and Marriages are incomplete.

‖ Sex undetermined, 54.

Particulars Regarding Births, Deaths, Marriages and Still-births Reported during the Year ending December 31, 1905.

BOROUGH OF MANHATTAN.

	Marriages.		Births.		Deaths.		Still-births.	
	M.	F.	M.	F.	M.	F.	M.	F.
White	27,490	27,504	30,138	28,907	21,091	17,429	2,040	1,434
Colored	890	902	594	560	546	545	73	73
Chinese	19	2	4	......	55	5	......	......
Native parents	......	......	6,225	5,800	3,651	3,270	434	329
Foreign parents	......	......	20,905	20,227	13,383	11,969	1,319	905
Parentage of mixed nativities	......	......	3,180	3,020	1,646	1,404	199	142
Parentage unknown or not stated	......	......	426	420	2,012	1,336	160	132
Single	25,510	25,635	......	......	12,723	9,117	......	......
Married	......	......	......	......	6,645	4,826	......	......
Widowed	2,717	2,439	......	......	1,970	3,731	......	......
Divorced	181	334	......	......	33	23	......	......
Not stated	......	......	......	......	321	82	......	......
Total	28,408		60,203		39,671		‡3,660	
Month of utero-gestation: 1							......	
2							25	
3							88	
4							165	
5							283	
6							415	
7							556	
8							433	
9							1,512	
10							168	
Not stated							15	

‡ Sex undetermined, 40.

Particulars Regarding Births, Deaths, Marriages and Still-births Reported during the Year ending December 31, 1905.

BOROUGH OF THE BRONX.

	Marriages.		Births.		Deaths.		Still-births.	
	M.	F.	M.	F.	M.	F.	M.	F.
White	1,801	1,800	3,378	3,165	3,054	2,270	172	135
Colored	19	20	62	54	99	104	1	2
Chinese	......	......	......	......	1	......	......	......
Native parents	......	......	1,389	1,287	615	532	60	48
Foreign parents	......	......	1,290	1,182	1,979	1,436	71	59
Parentage of mixed nativities	......	......	744	731	329	286	32	22
Parentage unknown or not stated	......	......	17	19	231	120	10	8
Single	1,615	1,656	......	......	1,717	1,092	......	......
Married	......	......	......	......	1,056	755	......	......
Widowed	193	147	......	......	346	525	......	......
Divorced	12	17	......	......	2	......	......	......
Not stated	......	......	......	......	33	2	......	......
Total	1,820		6,659		5,528		†310	

Month of utero-gestation		Still-births
	1	......
	2	......
	3	1
	4	15
	5	23
	6	37
	7	41
	8	43
	9	124
	10	24
	Not stated	2

† Sex undetermined.

Particulars Regarding Births, Deaths, Marriages and Still-births Reported during the Year ending December 31, 1905.

BOROUGH OF BROOKLYN.

	Marriages.		Births.		Deaths.		Still-births.	
	M.	F.	M.	F.	M.	F.	M.	F.
White	10,416	10,415	15,473	15,117	12,328	11,020	1,103	826
Colored	366	367	185	197	277	300	27	23
Chinese	......	......	......	......	10	......	......	......
Native parents	......	......	5,589	5,330	3,037	2,940	438	350
Foreign parents	......	......	7,837	7,763	7,359	6,647	506	354
Parentage of mixed nativities	......	......	2,159	2,138	1,402	1,294	128	86
Parentage unknown or not stated	......	......	73	83	817	439	58	59
Single	9,630	9,669	......	......	6,966	5,484	......	......
Married	......	......	......	......	4,166	3,173	......	......
Widowed	1,075	1,017	......	......	1,337	2,633	......	......
Divorced	77	96	......	......	6	4	......	......
Not stated	......	......	......	......	140	26	......	......
Total	10,782		30,972		23,935		§1,991	
Month of utero-gestation .. 1							......	
2							2	
3							19	
4							66	
5							133	
6							239	
7							286	
8							270	
9							943	
10							12	
Not stated							11	

§ Sex undetermined, 12.

Particulars Regarding Births, Deaths, Marriages and Still-births Reported during the Year ending December 31, 1905.

BOROUGH OF QUEENS.

	Marriages.		Births.		Deaths.		Still-births.	
	M.	F.	M.	F.	M.	F.	M.	F.
White	1,048	1,046	2,240	2,040	1,755	1,354	135	140
Colored	44	46	38	37	40	42	4	3
Chinese	......	......	......	......	......	......	......	......
Native parents	......	......	963	882	482	377	55	60
Foreign parents	......	......	874	794	1,025	811	58	61
Parentage of mixed nativities	......	......	437	395	189	166	16	17
Parentage unknown or not stated	......	......	4	6	99	42	10	5
Single	956	995	......	......	973	664	......	......
Married	......	......	......	......	610	430	......	......
Widowed	132	92	......	......	189	299	......	......
Divorced	4	5	......	......	2	1	......	......
Not stated	......	......	......	......	21	2	......	......
Total	1,092		4,355		3,191		◈284	

			Still-births.
Month of utero-gestation	1	......	......
	2	......	1
	3	......	8
	4	......	6
	5	......	24
	6	......	33
	7	......	47
	8	......	33
	9	......	123
	10	......	......
	Not stated	......	9

◈ Sex undetermined, 2.

Particulars Regarding Births, Deaths, Marriages and Still-births Reported during the Year ending December 31, 1905.

BOROUGH OF RICHMOND.

	Marriages.		Births.		Deaths.		Still-births.	
	M.	F.	M.	F.	M.	F.	M.	F.
White	558	558	875	791	833	527	68	36
Colored	15	15	12	14	18	11	2	1
Chinese	......	......	......	......	......	......	......	......
Native parents	......	......	407	353	229	158	22	15
Foreign parents	......	......	333	302	436	295	26	12
Parentage of mixed nativities	......	......	144	148	69	49	18	7
Parentage unknown or not stated	......	......	3	2	117	36	4	3
Single	514	535	......	......	454	234	......	......
Married	......	......	......	......	264	176	......	......
Widowed	55	36	......	......	120	127	......	......
Divorced	4	2	......	......	......	......	......	......
Not stated	......	......	......	......	13	1	......	......
Total	573		1,692		1,389		✠ 107	

Month of utero-gestation		Still-births
	1	......
	2	1
	3	3
	4	2
	5	4
	6	9
	7	18
	9	13
	9	45
	10	12
	Not stated	......

✠ Sex undetermined.

Deaths of Males by Age, and Cause of Death,

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.											
1. Typhoid fever........	649	382	1	4	2	5	1	13	10	15	44
2. Typhus fever.........	..	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever.......	..	..	..	..	..	..	..	..	..	..	..
4. Malarial fever........	53	31	2	..	3	..	..	5	1	..	2
5. Smallpox.............	9	3	..	..	..	1	..	1	..	..	..
6. Measles...............	520	273	94	109	29	16	7	255	15	..	..
7. Scarlet fever..........	473	233	22	33	42	35	29	161	47	11	3
8. Whooping cough.....	408	196	104	52	21	12	4	193	3	..	..
9. Diphtheria and croup.	1,544	787	94	188	151	118	69	620	133	18	5
10. Influenza.............	311	152	14	11	4	3	1	33	1	2	4
11. Miliary fever..........	..	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras.......	..	..	..	..	..	..	..	..	..	..	..
14. Dysentery............	149	65	13	9	3	2	1	28	1	1	..
15. Plague................	..	..	..	..	..	..	..	..	..	..	..
16. Yellow fever..........	1	1	..	..	..	..	..	..	..	..	..
17. Leprosy	1	1	..	..	..	..	..	..	..	..	.
18. Erysipelas............	264	149	56	3	1	..	..	60	..	1	4
19. Other epidemic diseases	11	7	5	..	..	..	..	5	1	..	..
20. Pyæmia, septicæmia..	73	45	16	2	..	..	..	18	1	..	1
21. Glanders..............	2	1	..	..	..	..	..	..	..	..	..
22. Malignant pustule....	2	2	..	..	..	..	..	..	..	..	..
23. Hydrophobia.........	4	3	..	..	1	..	..	1	..	..	..
24. Actinomycosis........	2	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis..........	..	..	..	..	..	..	..	..	..	..	..
25. Pellagra..............	..	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	68	51	1	..	..	..	..	1	..	..	3
27. Tuberculosis of lungs.	8,535	5,332	47	24	17	11	6	105	18	23	237
28. Tubercular meningitis	644	339	77	73	52	29	14	245	38	9	8
29. Abdominal tuberculosis...............	185	97	17	9	3	3	1	33	8	2	2
30. Pott's disease.........	58	32	2	1	1	1	2	7	3	8	3
31. Cold abscess..........	6	4	..	..	1	..	..	1	1	..	..
32. White swelling.......	37	24	2	..	..	..	..	2	6	4	3
33. Tuberculosis of other organs.............	69	35	2	2	..	..	..	4	4	2	2
34. General tuberculosis..	56	29	1	4	1	1	1	8	5	1	1

NEW YORK.

for the Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
69	57	45	55	25	20	10	8	9	1	1	..	..	..	8	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	4	2	2	2	..	1	1	3	3	1	2	1	..	1	..
..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..
..	2	..	..	..	..	1	..	..	..	..	..	..	..	..	..
7	3	1	..	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	14	..
1	2	6	1	..	..	..	..	..	..	..	1	..	..	6	..
4	5	5	6	9	11	11	11	12	7	8	16	7	..	6	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	..	3	4	..	2	..	1	2	5	6	5	4	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1
2	4	4	9	15	12	16	3	9	3	4	2	1	..	1	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
1	2	3	5	4	5	1	2	..	..	1	1	..	..	..	..
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	3	6	6	7	10	6	3	3	..	..	..	..	..	2	..
522	688	826	857	684	518	356	217	142	91	32	12	4	..	215	37
6	9	5	4	8	3	2	..	1	1	..	..	..	..	10	..
10	9	6	5	7	3	5	1	1	3	1	1	..	..	4	..
1	..	4	..	1	2	1	1	..	1	..	..	..	..	2	..
..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..
1	1	..	2	1	1	2	..	1	..	..	..	..	..	..	..
1	1	2	3	1	4	3	3	2	1	1	1	..	..	..	..
1	4	1	2	2	1	..	2	1	..	..	..	..	..	4	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 year.	1	2	3	4	Total Under 5.	5	10	15
35. Scrofula	4	1	1	..	..	..	..	1	..	..	..
36. Syphilis	221	130	78	6	1	..	..	85	1	2	3
37. Gonorrhœa (adults)	13	8	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children)	3	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	108	88	..	..	..	..	..	..	2	..	..
40. Cancer of stomach, liver	1,135	568	..	..	..	..	..	..	..	1	1
41. Cancer of intestines, rectum	399	179	..	..	1	..	..	1	1	..	2
42. Cancer of female genital organs	478	..	..	..	..	..	..	..	..	..	..
43. Cancer of breast	266	1	..	..	..	..	..	..	..	..	..
44. Cancer of skin	82	64	..	..	..	..	..	..	..	1	1
45. Cancer of other organs and unspecified	407	234	4	1	..	1	1	7	1	..	5
46. Other tumors (except of female genital organs)	51	20	1	..	..	1	..	2	..	..	..
47. Acute articular rheumatism	380	202	6	1	2	2	1	12	27	19	18
48. Chronic rheumatism and gout	131	59	..	1	..	..	..	1	1	1	4
49. Scurvy	10	7	7	..	..	..	..	7	..	..	..
50. Diabetes	589	266	..	..	..	1	..	1	1	1	4
51. Exophthalmic goitre	21	7	1	..	..	..	..	1	..	..	..
52. Addison's disease	17	8	..	1	..	..	..	1	..	..	1
53. Leukæmia	61	31	1	1	..	..	..	2	3	..	2
54. Anæmia, chlorosis	100	31	1	1	..	..	..	2	..	..	2
55. Other general diseases	2	1	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic	596	477	..	..	..	..	..	..	4	1	1
57. Lead poisoning	8	8	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	3	2	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings	14	5	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.											
60. Encephalitis	15	8	2	1	2	..	..	5	1	..	..
61. Simple meningitis	2,584	1,394	268	152	119	96	79	714	243	104	90
(of which) cerebro-spinal meningitis	2,025	1,094	178	112	95	81	65	531	209	92	84
62. Locomotor ataxia	78	60	..	..	..	..	..	..	..	1	..
63. Other diseases of spinal cord	146	83	3	2	4	..	1	10	2	..	1
64. Apoplexy, congestion of brain	2,833	1,386	15	1	1	..	..	17	2	1	3
65. Softening of brain	58	27	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified	205	92	..	2	1	..	1	4	..	..	..
67. General paresis	204	154	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	4	11	6	2	10	3	2	1	..	..	..	..	..	7	..
1	..	2	1	..	2	1	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	1	3	9	14	5	13	16	11	6	3	2	..	..	..
2	5	12	26	53	59	66	99	76	80	47	30	7	4	..	..
7	7	9	13	11	13	25	22	20	18	12	13	4	1	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
..	2	1	5	6	5	11	6	7	7	5	4	3	..	..	..
7	7	8	7	17	23	21	21	45	28	20	13	4	..	1	1
..	1	1	4	4	..	3	..	1	1	1	2	..	..	1	..
9	12	11	15	12	18	11	14	7	11	3	2	1	..	1	1
..	2	..	3	2	4	6	10	2	6	6	9	..	2	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	10	9	15	17	21	34	36	29	39	26	10	6	1	1	..
..	1	1	1	1	1	..	..	..	..	..	1	..	..	..	..
1	..	1	2	1	..	..	1	..	..	..	..	..	..	..	..
3	2	3	1	2	3	4	2	1	2	1	..	..	..	..	..
4	2	..	1	6	3	3	..	3	2	2	1	..	..	1	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
8	51	76	88	91	63	40	24	10	16	3	1	..	..	2	..
2	..	1	1	2	1	1	..	..	..	..	..	..	..	..	..
..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	1	1	1	1	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..
66	40	36	29	26	10	16	6	6	6	2	..	..	..	29	..
57	35	24	22	15	7	12	3	1	2	..	..	..	..	22	..
..	2	1	2	8	5	10	7	12	3	6	1	2	..	1	..
2	3	2	6	7	6	6	9	12	8	5	2	2	..	2	..
4	21	28	46	69	126	147	157	186	198	168	119	63	31	20	1
..	..	..	2	2	..	5	1	2	7	5	2	1	..	..	..
..	3	1	6	4	4	4	5	13	15	14	10	5	4	5	..
..	3	16	25	34	27	19	5	7	3	7	4	1	3	2	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
68. Other forms of insanity	53	25	..	1	..	..	..	1	..	..	..
69. Epilepsy	121	81	11	3	1	1	..	16	2	1	7
70. Convulsions (not puerperal)	5	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants	781	413	294	70	24	7	6	401	11	..	1
72. Tetanus, trismus	67	53	16	..	..	1	1	18	4	4	3
73. Chorea	8	4	..	..	..	..	..	..	2	..	1
74. Other nervous diseases	185	97	7	4	1	2	..	14	10	3	4
75. Diseases of the eyes	5	4	2	..	..	..	..	2	1	..	..
76. Diseases of the ear	153	92	19	5	4	1	2	31	1	6	3
III.—Diseases of Circulatory System.											
77. Pericarditis	61	36	1	..	1	..	..	2	3	2	2
78. Acute endocarditis	411	197	4	..	..	1	4	9	9	4	4
79. Organic heart diseases	5,140	2,563	13	2	7	2	6	30	37	51	60
80. Angina pectoris	171	106	..	..	..	..	..	..	1	..	..
81. Diseases of arteries, aneurism, etc	352	209	..	..	1	..	..	1	..	1	..
82. Embolism, thrombosis	172	85	..	..	1	..	..	1	..	..	1
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	30	12	1	..	..	1	..	2	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	23	14	7	1	2	..	..	10	2	..	..
85. Hæmorrhage	77	37	21	1	..	1	..	23	1	1	1
86. Other diseases of circulatory system	..	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.											
87. Diseases of nasal fossæ	..	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx	50	26	4	4	4	..	1	13	6	..	..
89. Diseases of thyroid gland	6	2	1	..	..	..	..	1	..	..	..
90. Acute bronchitis	1,417	699	434	113	28	9	8	592	5	2	1
91. Chronic bronchitis	315	137	4	1	2	..	1	8	1	..	1
92. Broncho-pneumonia	4,126	2,165	1,003	506	153	70	32	1,764	43	7	9
93. Pneumonia	5,657	3,205	324	194	85	32	26	661	62	38	68
94. Pleurisy	305	189	14	18	8	3	2	45	8	4	6
95. Congestion of lungs, pulmonary apoplexy	116	52	14	4	..	..	..	18	..	..	..
96. Gangrene of lung	23	14	1	..	1	..	..	2	..	1	1
97. Asthma	186	104	..	1	..	..	..	1	..	1	..
98. Pulmonary emphysema	80	49	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	90	54	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	Over 85 years.	Colored.	Chinese.
1	2	3	4	2	..	1	1	2	4	3	..	1	..	..	..
6	10	7	4	10	3	5	1	4	3	1	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	..
3	3	2	1	4	1	5	2	3	..	..	..	..	..	..	..
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
8	8	7	12	7	9	1	3	4	2	3	1	1	..	1	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
11	6	4	4	6	5	3	2	4	4	2	..	..	..	1	..
1	3	..	..	4	3	2	3	4	4	2	1	..	..	..	..
8	11	14	16	13	13	15	19	15	18	11	11	4	3	4	1
74	99	115	177	191	205	234	255	283	263	211	161	71	46	59	3
..	2	3	6	5	12	7	10	25	16	11	6	2	..	..	..
1	5	9	7	13	18	14	20	21	21	26	23	18	11	4	1
1	3	3	2	7	8	9	4	7	10	11	8	5	5	2	..
1	..	2	..	1	..	3	..	1	1	..	..	..	1	..	..
..	..	..	..	..	1	..	..	..	1	..	..	..	..	2	..
2	1	2	1	1	3	..	..	..	..	1	..	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	1	1	1	..	..	..	1	1	..	..	..	..	1	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
5	1	1	2	2	5	7	10	6	11	8	11	11	9	26	..
..	3	3	4	6	7	6	12	21	12	17	16	13	7	..	..
17	15	18	33	27	24	27	33	24	42	26	23	19	14	70	..
109	193	212	287	278	250	237	180	223	152	126	82	30	17	88	5
16	16	7	15	13	20	10	9	3	8	5	2	1	1	2	..
..	1	2	4	3	4	1	1	1	5	1	6	2	3	1	..
1	..	2	..	1	1	2	2	..	1	..	..	..	..	..	..
1	..	1	4	4	7	11	16	12	14	17	8	5	2	1	..
..	..	..	2	2	4	8	7	7	8	2	6	2	1	..	..
2	8	7	12	5	5	5	4	3	1	1	..	..	1	4	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
V.—Diseases of Digestive System.											
100. Diseases of mouth and adnexa	16	9	4	1	1	..	..	6	1	..	..
101. Diseases of pharynx..	47	26	9	4	2	..	1	16	2	1	..
102. Diseases of œsophagus	6	6	..	1	..	..	..	1	..	..	..
103. Ulcer of stomach.....	152	98	..	..	..	..	..	..	..	..	1
104. Other diseases of stomach (cancer excepted)	360	183	28	13	2	8	1	52	7	2	..
105. Diarrhœa and enteritis (under 2 years)	5,877	3,156	2,646	510	..	..	..	3,156	..	..	..
(of which) chronic diarrhœa ..	..	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (2 years and over)	754	350	..	..	83	32	20	135	27	8	7
107. Intestinal parasites...	6	4	..	1	1	..	..	2	..	..	..
108. Hernia, intestinal obstruction........	570	258	57	2	2	3	..	64	2	6	8
109. Other diseases of intestines............	41	23	3	1	..	..	1	5	..	..	1
110. Acute yellow atrophy of liver........	9	1	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver...............	8	7	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver......	907	559	1	..	..	..	1	2	1	..	1
113. Biliary calculi.........	102	29	1	..	..	..	..	1	..	..	..
114. Other diseases of liver	162	86	5	1	..	..	..	6	2	2	3
115. Diseases of spleen.....	5	2	..	1	..	..	..	1	..	..	..
116. Simple peritonitis (non-puerperal)....	91	45	6	..	..	..	..	6	3	1	2
117. Other diseases of digestive system (except tuberculosis and cancer)........	16	9	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess.......	507	308	1	1	..	4	3	9	23	47	27
VI.—Diseases of Genito-urinary System.											
119. Acute nephritis.......	693	356	30	15	10	6	7	68	21	3	12
120. Bright's disease.......	5,251	2,797	5	1	4	1	1	12	12	16	19
121. Other diseases of kidneys and adnexa	81	47	1	..	..	..	..	1	1	1	2
122. Urinary calculus......	14	11	..	1	..	..	..	1	..	..	..
123. Diseases of bladder...	80	67	..	..	..	..	..	..	..	..	1
124. Diseases of urethra, urinary abscess,etc.	32	30	..	..	..	..	..	..	..	1	..
125. Diseases of the prostate	75	75	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs.........	2	2	1	..	..	..	..	1	..	..	..
127. Metritis................	2	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)....	4	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer)............	73	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus	35	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..
..	2	2	..	..	2	..	..	..	..	..	1	..	..	..	..
..	..	1	..	1	..	2	..	1	..	..	..	..	..	..	..
4	5	12	9	13	14	11	9	7	7	1	3	1	1	3	1
2	5	10	9	12	11	8	15	13	9	8	11	7	2	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	71	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	10	10	14	17	13	8	14	13	10	20	18	8	7	13	..
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
10	9	11	18	16	19	18	19	14	22	9	5	4	2	4	1
2	..	..	1	3	1	..	3	1	4	2	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
2	1	..	1	2	1	..	..	..	..	..	..	..	..	..	..
1	13	34	45	52	84	96	70	70	47	26	11	5	1	7	1
..	..	1	3	4	2	4	6	3	3	1	1	..	..	..	..
1	10	4	5	4	10	8	9	7	6	5	2	2	..	1	..
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
7	4	..	4	6	4	3	3	1	..	1	..	..	..	1	..
..	..	2	1	2	3	..	..	..	1	..	..	..	..	..	..
34	36	34	23	23	12	11	8	15	4	1	1	..	..	3	..
19	29	30	19	29	21	22	23	17	18	13	4	5	3	4	..
49	103	153	173	200	278	281	317	327	325	224	172	85	51	60	5
2	2	4	6	2	2	2	5	5	5	3	3	1	..	..	..
..	..	..	1	1	2	2	1	2	..	..	1	..	..	..	..
1	..	1	..	1	2	4	7	7	6	9	11	12	5	..	..
..	1	3	5	3	2	5	1	4	3	2	..	..	..	1	..
..	..	..	..	1	1	2	5	13	10	18	16	6	3	..	..
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
131. Ovarian cysts and tumors	70	..	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs	142	..	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal, nor cancer)	1	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.											
134. Accidents of pregnancy	169	..	..	..	..	..	..	..	..	..	..
135. Puerperal hæmorrhage	49	..	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	114	..	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia.	309	..	..	..	..	..	..	..	..	..	..
138. Puerperal albuminuria and convulsions	155	..	..	..	..	..	..	..	..	..	..
139. Puerperal phlegmasia alba dolens	2	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	16	..	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast	1	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.											
142. Gangrene	116	51	1	1	4	..	..	6	2	..	1
143. Carbuncle	14	10	2	..	..	..	..	2	..	..	..
144. Plegmon, acute abcess	95	49	9	1	2	..	..	12	3	..	2
145. Other diseases of skin and adnexa	36	21	10	1	1	..	1	13	..	..	..
IX.—Diseases of Locomotor System.											
146. Diseases of bones (non-tuberculous)	130	78	13	20	5	2	1	41	7	3	1
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	12	6	1	1	..	..	..	2	1	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	1	..	..	..	..	..	..	..	..	..	..
X.—Malformations.											
150. Congenital malformations	566	326	290	16	5	7	..	318	4	3	1
XI.—Diseases of Infancy.											
151. Congenital debility, icterus and sclerema	3,453	1,924	1,917	4	2	1	..	1,924	..	..	..
151a. Injury during birth..	322	180	179	1	..	..	..	180	..	..	..
152. Other diseases peculiar to infancy	116	65	65	..	..	..	..	65	..	..	..
153. Neglect	14	9	9	..	..	..	..	9	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	1	..	2	2	..	6	4	8	9	4	2	3	1	..
..	..	1	1	..	..	1	..	3	1	..	1	..	..	..	..
5	2	4	4	1	5	3	1	..	1	4	1	1	..	..	..
..	1	..	..	2	..	..	..	..	3	1	1	..	..	..	..
2	1	2	3	3	2	2	2	1	..	3	2	2	1	4	..
..	..	..	..	2	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	82	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..
..	..	..	..	..	..	..	..	..	..	.	..	..	..	2	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
XII.—Diseases of Old Age.											
154. Senile debility........	723	249	..	..	..	..	..	..	..	..	..
XIII.—External Causes.											
155. Suicide by poison.....	129	72	..	..	..	..	..	..	..	..	3
156. Suicide by asphyxia..	150	113	..	..	..	..	..	..	..	..	3
157. Suicide by hanging or strangulation...	84	69	..	..	..	..	..	..	..	..	..
158. Suicide by drowning..	7	5	..	..	..	..	..	..	..	..	..
159. Suicide by firearms...	206	191	..	..	..	..	..	..	..	..	8
160. Suicide by cutting instruments	40	34	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height...	37	21	..	..	..	..	..	..	..	..	..
162. Suicide by crushing...	7	7	..	..	..	..	..	..	..	..	..
163. Suicide by other methods...........	..	..	..	..	..	..	..	..	..	..	..
164. Fractures.............	175	147	1	..	1	3	1	6	6	8	7
165. Dislocations..........	3	2	..	..	..	..	..	..	..	..	..
166. Other accidental injuries	1,732	1,450	6	11	17	22	24	80	117	48	80
167. Burn, by fire scald.....	388	157	6	23	26	22	12	89	15	4	5
168. Burning by corrosive substances	2	2	..	..	..	..	..	..	..	..	..
169. Sunstroke............	239	164	34	7	2	2	2	47	3	1	3
170. Freezing	6	5	..	..	..	..	..	..	..	..	1
171. Electrical shock......	23	22	..	..	..	..	..	..	..	1	2
172. Accidental drowning..	488	458	3	..	2	2	3	10	29	20	30
173. Inanition (starvation)	3	2	1	..	..	..	..	1	..	..	..
174. Inhalation of noxious gas, not suicidal...............	363	246	3	2	..	1	..	6	5	6	10
175. Other acute poisoning	95	60	6	1	4	3	3	17	3	..	1
176. Other external violence	299	207	43	1	1	2	..	47	3	4	12
(Of which)											
a. Homicide, by blows	27	25	1	..	..	..	..	2	..	1	..
b. Homicide, by sharp instruments......	32	27	..	1	..	..	..	1	..	..	3
c. Homicide, by gunshot........	96	76	..	..	..	..	..	..	1	..	7
d. Homicide, by poison	1	1	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods.	9	3	1	..	..	..	..	1	1	..	..
XIV.—Ill-defined or Not Specified Causes.											
177. Dropsy...............	..	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal..........	..	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes.....	1,092	560	476	72	4	4	1	557	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	..	..	..	..	..	..	5	17	41	51	53	76	1	..
3	5	15	10	4	7	7	9	5	3	1	..	..	..	2	..
9	11	13	16	15	14	9	6	7	5	3	2	..	..	..	..
2	4	6	9	8	11	7	6	8	3	2	2	1	..	..	..
1	..	1	..	..	..	1	2	..	..	..	..	..	..	..	..
18	20	24	17	20	22	17	13	15	10	6	1	..	..	2	..
1	..	7	3	4	7	3	..	4	3	..	..	1	1	..	..
4	4	4	5	2	..	2	..	..	..	..	..	..	..	..	..
1	1	1	2	..	1	..	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	10	12	18	15	15	9	6	7	6	4	2	..	2	1	1
..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..
132	132	150	171	140	114	82	67	51	39	21	10	12	4	25	..
5	3	8	10	8	4	1	2	..	1	..	..	2	..	3	..
1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
7	7	11	11	18	14	7	11	6	4	9	3	1	1	4	..
..	..	..	..	1	..	1	1	1	..	..	..	..	..	..	..
6	4	4	1	1	2	..	1	..	..	..	..	..	..	..	..
39	43	45	65	56	39	32	24	9	12	3	1	1	..	3	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
20	20	34	29	34	23	19	15	6	9	4	3	2	1	1	2
2	4	5	2	8	4	5	..	4	3	2	..	..	..	1	..
23	28	24	23	22	5	6	4	5	..	..	..	1	..	13	6
2	3	2	3	6	1	3	1	2	..	..	..	..	..	2	1
6	3	3	5	4	2	..	..	..	..	..	..	..	..	..	..
12	19	14	13	6	1	2	1	..	..	..	..	..	..	10	5
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	1	..	..	..	..	1	..	..	..	21	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General diseases...	19,233	10,671	670	536	336	242	138	1,922	337	123	366
a. Tuberculous diseases	9,658	5,943	149	113	75	45	24	406	83	49	259
b. Cancer	2,875	1,134	4	1	1	1	1	8	4	2	9
II.—Diseases of nervous system and organs of sense	7,501	3,973	637	241	157	108	90	1,233	279	120	113
III.—Diseases of circulatory system..	6,437	3,259	47	4	12	5	10	78	53	59	68
IV.—Diseases of respiratory system	12,371	6,696	1,799	841	281	114	70	3,105	125	53	86
V.—Diseases of digestive system....	9,636	5,159	2,761	536	91	47	27	3,462	68	67	50
VI.—Diseases of genito-urinary system	6,555	3,385	37	17	14	7	8	83	34	21	34
VII.—Puerperal diseases.	815	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of skin and cellular tissue	261	131	22	3	7	..	1	33	5	..	3
IX.—Diseases of locomotory system.	143	84	14	21	5	2	1	43	8	3	1
X.—Malformations.....	566	326	290	16	5	7	..	318	4	3	1
XI.—Diseases of infancy	3,905	2,178	2,170	5	2	1	..	2,178	..	..	..
XII.—Diseases of old age	723	249	..	..	..	..	..	..	..	..	..
XIII.—External causes....	4,476	3,434	103	45	53	57	45	303	181	92	165
a. Suicide..........	660	512	..	..	..	..	..	..	..	..	14
b. Homicide........	165	132	2	1	..	..	..	3	2	1	10
c. Accident	3,651	2,790	101	44	53	57	45	300	179	91	141
XIV.—Causes ill defined..	1,092	560	476	72	4	4	1	557	..	..	..
Total males.....	....	40,105	9,026	2,337	967	594	391	13,315	1,094	541	887
Total females...	....	33,609	7,496	1,957	883	539	349	11,224	1,062	573	852
Total both sexes.	....	73,714	16,522	4,294	1,850	1,133	740	24,539	2,156	1,114	1,739

Deaths of Females by Age, and Cause of Death,

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.										
1. Typhoid fever	267	1	1	1	4	4	11	13	21	36
2. Typhus fever	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever	..	..	..	..	..	..	..	..	..	..
4. Malarial fever	22	1	1	1	..	..	3	1	1	3
5. Small-pox	6	..	1	..	1	..	2	..	..	..
6. Measles	247	72	88	34	23	9	226	15	2	1

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
685	906	1,068	1,156	1,010	831	652	503	404	334	186	131	45	12	289	40
545	715	850	880	711	542	375	227	152	97	34	14	4	..	237	37
17	23	31	54	97	114	128	161	164	144	90	63	20	5	2	1
101	102	107	141	179	196	223	200	256	253	216	140	76	38	72	1
88	124	148	209	235	263	284	311	356	334	273	210	100	66	72	5
152	238	254	364	342	327	314	275	311	255	203	154	83	55	193	5
75	95	123	134	156	176	169	156	145	116	74	53	27	13	103	3
71	136	191	204	237	308	318	359	375	367	269	207	109	62	65	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	3	6	5	5	7	4	7	7	13	14	7	3	3	1	..
2	1	2	3	5	2	3	2	1	..	3	2	2	1	4	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	91	..
..	..	..	..	..	..	..	..	5	17	41	57	53	76	1	..
288	296	364	392	356	282	208	168	131	98	56	24	21	9	55	9
39	45	71	62	53	62	46	37	39	24	12	5	2	1	4	..
21	25	19	22	16	4	5	2	2	..	..	..	..	..	12	6
228	226	274	308	287	216	157	129	90	74	44	19	19	8	39	3
..	1	..	..	..	1	..	..	..	..	1	..	..	..	21	..
1,468	1,902	2,263	2,608	2,525	2,393	2,175	1,981	1,991	1,787	1,336	985	519	335	976	68
1,326	1,632	1,550	1,747	1,575	1,476	1,616	1,569	1,835	1,737	1,465	1,126	711	533	1,021	5
2,794	3,534	3,813	4,355	4,100	3,869	3,791	3,550	3,826	3,524	2,801	2,111	1,230	868	1,997	73

for the Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
46	31	38	26	16	6	5	7	3	3	2	3	..	..	5	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	..	2	1	2	..	1	1	3	1	1	..	..	..	..	..
1	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..
3	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
7. Scarlet fever	240	13	25	43	36	20	137	76	11	3
8. Whooping cough	212	106	55	19	15	9	204	7	..	..
9. Diphtheria and croup	757	73	155	150	102	78	558	157	20	4
10. Influenza	159	11	1	2	2	..	16	1	4	7
11. Miliary fever	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..
14. Dysentery	84	12	4	2	1	1	20	5	2	1
15. Plague	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	..	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..
18. Erysipelas	115	61	3	..	..	..	64	..	2	3
19. Other epidemic diseases	4	3	..	1	..	..	4	..	..	..
20. Pyæmia, septicæmia	28	18	..	2	..	..	20	1	1	1
21. Glanders	1	..	..	..	..	..	..	..	..	..
22. Malignant pustule	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia	1	..	..	..	..	1	1	..	..	..
24. Actinomycosis	2	..	..	..	..	..	..	..	1	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	17	..	..	..	..	..	..	1	..	1
27. Tuberculosis of lungs	3,203	18	28	15	8	8	77	36	73	283
28. Tubercular meningitis	305	77	68	48	22	13	228	39	9	6
29. Abdominal tuberculosis	88	16	5	2	..	3	26	5	1	4
30. Potts' disease	26	1	1	2	1	..	5	5	3	1
31. Cold abscess	2	..	1	..	..	..	1	..	..	..
32. White swelling	13	..	..	1	1	1	3	..	2	..
33. Tuberculosis of other organs	34	2	2	2	..	..	6	4	1	..
34. General tuberculosis	27	4	2	3	..	1	10	1	2	1
35. Scrofula	3	1	1	..	1	..	3	..	..	..
36. Syphilis	91	47	3	1	..	..	51	2	..	2
37. Gonorrhœa (adults)	5	..	..	..	..	..	..	..	1	1
38. Gonorrhœa (children)	3	3	..	..	..	..	3	..	..	..
39. Cancers, etc., of the mouth	20	..	..	1	..	..	1	..	..	..
40. Cancer of stomach, liver	567	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum	220	..	..	..	..	..	..	..	1	1
42. Cancer of female genital organs	478	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over	Colored.	Chinese.
4	3	3	2	..	..	..	..	1	..	..	..	..	..	4	..
..	..	..	..	1	..	..	..	..	..	..	..	..	..	12	..
3	4	4	2	2	..	..	1	1	1	..	..	..	..	8	..
5	5	4	4	6	4	7	8	16	21	15	13	16	7	5	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	1	3	4	1	3	6	7	6	1	12	7	3	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	1	2	1	7	8	6	3	6	2	3	1	3	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	1	..	1	1	..	..	..	..	1	..	..	..	..	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	4	2	..	1	1	..	1	..	2	1	..	..	..	1	..
504	553	465	413	261	156	126	96	76	54	20	5	2	3	184	2
8	5	5	2	1	2	..	..	..	..	..	..	..	..	14	..
8	8	4	10	7	3	4	1	4	3	..	..	..	..	11	..
1	5	..	2	2	..	1	1	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	1	1	1	2	1	1	..	..	..	..	..	..	..	..
6	4	..	4	1	3	..	1	1	..	..	1	1	1	..	..
..	4	..	3	3	1	..	..	..	..	1	1	..	..	2	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
6	8	5	5	5	4	1	..	..	1	..	1	..	..	10	..
1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	1	..	1	3	4	2	1	3	2	1	..	1	..
2	11	5	32	43	58	77	83	89	77	58	23	7	2	10	..
1	1	7	18	28	26	33	26	25	23	15	12	3	..	5	..
..	18	32	44	70	87	76	49	30	36	22	10	1	3	14	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
43. Cancer of the breast	265	..	..	..	..	..	..	..	..	..
44. Cancer of the skin	18	1	..	1	..	..	2	..	..	..
45. Cancer of other organs and unspecified	173	1	..	1	..	1	3	5	2	3
46. Other tumors (except of female genital organs)	31	2	..	..	..	..	2	1	..	2
47. Acute articular rheumatism	178	4	1	1	5	4	15	18	19	14
48. Chronic rheumatism and gout	72	..	..	..	..	1	1	2	2	..
49. Scurvy	3	2	..	..	..	..	2	..	..	..
50. Diabetes	323	..	..	1	..	..	1	2	5	3
51. Exophthalmic Goitre	14	..	..	..	..	..	..	..	..	1
52. Addison's disease	9	..	..	..	..	..	..	..	..	1
53. Leukæmia	30	4	..	..	..	1	5	2	1	2
54. Anæmia, chlorosis	69	3	..	..	2	..	5	1	2	3
55. Other general diseases	1	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic.	119	..	..	..	..	..	..	..	..	1
57. Lead poisoning	..	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	1	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings	9	..	..	..	..	..	..	..	..	..
II. Diseases of Nervous System and Organs of Sense.										
60. Encephalitis	7	..	..	..	1	..	1	..	..	..
61. Simple meningitis	1,190	205	131	107	71	43	557	240	113	75
(of which) Cerebro-spinal meningitis	931	115	90	80	62	40	387	210	102	67
62. Locomotor ataxia	18	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord	63	1	..	2	..	1	4	1	3	4
64. Apoplexy, congestion of brain.	1,447	11	3	..	..	..	14	3	3	..
65. Softening of brain	31	1	..	..	..	..	1	..	..	..
66. Paralysis unspecified	113	2	1	..	..	1	4	2	..	..
67. General paresis	50	..	..	..	..	..	..	..	1	..
68. Other forms of insanity	28	..	..	..	..	..	..	..	..	..
69. Epilepsy	40	1	2	1	..	..	4	1	..	1
70. Convulsions (not puerperal)	5	..	..	..	..	..	..	1	2	1
71. Convusions of infants	368	293	48	14	9	3	367	1	..	..
72. Tetanus, trismus	14	6	..	..	..	..	6	1	1	..
73. Chorea	4	..	..	..	..	..	..	2	1	1
74. Other nervous diseases	88	2	4	1	1	3	11	4	4	7
75. Diseases of the eye	1	..	..	..	..	..	..	..	..	..
76. Diseases of the ears	61	13	11	3	7	2	36	1	3	3

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	4	10	23	33	30	33	34	30	34	13	14	5	2	2	..
..	1	..	..	3	..	4	1	2	1	1	1	1	1	..	..
6	7	7	14	14	14	19	18	21	12	14	5	5	4	2	..
..	1	1	3	3	3	1	2	3	4	1	3	1	..	1	..
10	10	10	12	10	6	10	12	14	5	2	7	4	..	6	..
1	1	5	4	2	1	6	4	11	11	8	6	3	4	1	..
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
2	8	6	14	17	18	31	44	55	47	34	24	7	5	4	..
1	4	..	2	2	..	2	..	..	..	1	..	..	1	1	..
..	..	2	1	1	2	2	..	..	..	..	..	..	..	..	..
..	2	3	2	4	1	2	1	3	1	..	1	..	..	1	..
5	3	3	4	8	7	8	2	3	8	5	2	..	..	2	..
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
5	14	23	19	21	14	12	4	1	3	..	2	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
..	3	1	1	..	2	1	..	..	..	1	..	..	..	..	..
..	..	..	1	..	1	1	1	1	..	..	1	..	..	..	..
58	25	31	27	27	13	3	3	11	5	1	..	..	1	22	..
54	20	24	20	22	11	2	3	6	3	..	..	..	..	15	..
..	1	..	1	..	3	4	1	3	1	4	..	..	..	..	..
2	1	4	5	2	6	4	5	6	5	7	..	2	2	1	..
3	11	11	39	80	101	147	163	186	195	180	167	87	57	30	..
1	..	..	..	..	1	..	5	3	3	10	5	2	..	..	..
..	1	3	4	2	6	9	10	14	21	20	6	6	5	3	..
..	2	5	6	5	4	3	4	1	6	7	4	1	1	1	..
1	2	4	4	3	4	2	1	3	1	1	2	..	..	1	..
5	5	3	7	5	3	..	2	1	1	1	1	..	..	..	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	..
1	1	2	1	1	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	8	6	9	5	8	7	5	5	2	1	3	..	..	1	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
1	2	4	2	..	3	1	2	3	..	..	..	..	..	1	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
III.—Diseases of Circulatory System.										
77. Pericarditis	25	1	..	1	..	..	2	..	..	2
78. Acute endocarditis	214	4	1	..	3	1	9	18	7	15
79. Organic heart diseases	2,577	14	5	2	4	4	29	52	88	68
80. Angina pectoris	65	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc	143	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis	87	1	..	1	1	..	3	1	..	1
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	18	1	..	..	..	1	2	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	9	5	2	..	..	..	7	1	..	..
85. Hæmorrhage	40	24	1	..	2	1	28	1	1	1
86. Other diseases of circulatory system	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.										
87. Diseases of nasal fossae	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx	24	5	8	4	5	..	22	1	..	..
89. Diseases of thyroid gland	4	..	..	..	..	..	..	..	..	..
90. Acute bronchitis	718	369	96	24	11	8	508	15	8	7
91. Chronic bronchitis	178	9	1	3	..	..	13	1	..	2
92. Broncho-pneumonia	1,961	775	465	138	54	35	1,467	51	15	11
93. Pneumonia	2,452	267	164	71	39	24	565	58	32	63
94. Pleurisy	116	13	4	7	3	2	29	2	4	3
95. Congestion of lungs, pulmonary apoplexy	64	16	..	1	1	..	18	1	..	..
96. Gangrene of lung	9	..	..	1	..	..	1	..	..	..
97. Asthma	82	..	1	..	..	..	1	..	..	..
98. Pulmonary emphysema	31	1	1	..	..	..	2	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	36	..	1	..	..	..	1	..	..	1
V.—Diseases of Digestive System.										
100. Diseases of mouth and adnexa	7	2	1	2	..	..	5	..	1	1
101. Diseases of pharynx	21	7	1	3	1	1	13	1	1	1
102. Diseases of Œsophagus	..	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach	54	3	..	..	..	..	3	3	..	2
104. Other diseases of stomach (cancer excepted)	177	42	6	7	7	1	63	1	2	1
105. Diarrhœa and enteritis (under two years)	2,721	2,299	422	..	..	..	2,721	..	..	..
(of which) chronic diarrhœa	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over)	404	..	..	74	31	19	124	23	4	6
107. Intestinal parasites	2	..	..	1	..	..	1	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
3	2	3	4	2	3	..	1	2	..	..	1	..	..	7	..
9	9	9	12	16	13	12	13	15	24	16	9	6	2	6	..
64	94	100	142	166	188	210	233	294	253	256	179	98	63	62	..
..	..	2	5	5	3	7	7	6	12	11	5	2	..	3	..
2	..	..	4	5	5	8	8	16	15	23	21	18	18	3	..
4	1	8	4	4	9	6	9	11	10	6	3	3	4	3	..
1	2	..	..	3	1	3	1	1	2	1	1	..	..	..	..
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
2	1	..	..	1	2	2	..	1	..	..	..	..	..	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	..	..	1	..	1	..	..	1	..	..	1	..
1	3	..	4	2	3	16	12	13	33	29	22	23	19	34	..
2	7	3	3	5	5	9	16	25	18	24	18	16	11	3	..
12	13	24	12	22	29	30	30	44	60	36	46	34	25	66	..
79	91	94	149	117	127	169	167	190	178	164	104	64	41	82	2
8	13	6	6	11	4	5	4	8	5	3	3	1	1	2	..
1	2	..	..	..	..	1	3	4	4	10	10	6	4	3	..
..	..	2	1	1	1	2	..	..	..	1	..	..	..	..	..
..	1	..	2	3	2	11	11	14	14	14	5	2	2	..	..
..	2	..	1	3	..	4	3	5	4	3	2	2	..	1	..
5	2	1	7	3	4	1	1	4	1	3	1	..	1	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	1	1	..	..	..	..	1	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	4	1	11	8	2	5	1	2	3	3	3	1	..	1	..
1	5	5	8	4	11	10	6	11	15	14	8	7	5	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	66	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	5	11	14	10	15	14	20	29	37	21	30	19	11	10	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
108. Hernia, intestinal obstruction..	312	24	6	3	2	1	36	5	2	2
109. Other diseases of intestines....	18	1	..	..	..	1	2	1	..	2
110. Acute yellow atrophy of liver..	8	1	..	..	..	..	1	..	..	1
111. Hydatid tumor of liver.........	1	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver...............	348	1	..	..	1	..	2	..	..	1
113. Biliary calculi..................	73	2	..	1	..	..	3	..	..	1
114. Other diseases of liver	76	1	..	..	..	..	1	2	..	..
115. Diseases of spleen..............	3	1	..	..	..	..	1	..	..	..
116. Simple peritonitis (non-puerperal)........................	46	1	..	..	..	..	1	3	1	4
117. Other diseases of digestive system (except tuberculosis and cancer).................	7	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess..	199	..	..	2	2	1	5	26	25	24
VI.—Diseases of Genito-urinary System.										
119. Acute nephritis.................	337	23	8	9	8	2	50	15	14	21
120. Bright's disease................	2,454	9	2	2	1	..	14	6	12	25
121. Other diseases of kidneys and adnexa......................	34	1	..	..	..	..	1	1	..	2
122. Urinary calculus...............	3	..	..	..	..	..	..	..	..	..
123. Diseases of bladder............	13	1	..	..	..	..	1	..	..	..
124. Diseases of urethra, urinary abscess, etc	2	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs...............	..	..	..	..	..	..	..	..	..	..
127. Metritis........................	2	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)	4	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer)....	73	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus........	35	..	..	..	..	..	..	..	..	3
131. Ovarian cysts and tumors......	70	..	..	..	..	..	..	1	..	..
132. Other diseases of female genital organs...................	142	..	..	..	..	..	..	..	..	14
133. Diseases of breast (not puerperal, nor cancer)...........	1	1	..	..	..	..	1	..	..	..
VII.—Puerperal Diseases.										
134. Accidents of pregnancy........	169	..	..	..	..	..	..	..	..	7
135. Puerperal hæmorrhage.........	49	..	..	..	..	..	..	..	..	2
136. Other accidents of labor.......	114	..	..	..	..	..	..	..	2	4
137. Puerperal septicæmia..........	309	..	..	..	..	..	..	..	..	17
138. Puerperal albuminuria and convulsions..................	155	..	..	..	..	..	..	..	1	14
139. Puerperal phlegmasia alba dolens......................	2	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death................	16	..	..	..	..	..	..	..	..	1
141. Puerperal diseases of breast....	1	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
22	7	14	26	24	33	25	23	33	24	17	9	9	1	5	..
..	2	..	..	1	5	1	..	1	1	..	1	..	1	..	..
2	..	1	1	..	1	1	..	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	10	28	37	35	61	44	39	34	20	19	11	5	..	1	..
1	3	2	11	8	6	11	8	6	7	3	2	1	..	1	..
2	1	8	4	6	7	4	8	11	9	8	4	..	1	1	..
..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..
4	7	5	5	7	2	3	1	..	2	1	..	..	..	4	..
..	2	1	..	..	2	..	1	..	1	..	..	..	..	..	..
27	21	12	15	11	7	10	4	6	1	1	2	2	..	4	..
12	34	31	23	22	17	19	23	16	18	13	3	4	2	14	..
58	121	125	176	176	202	236	239	297	267	196	151	96	57	62	..
2	2	6	4	3	2	3	2	1	2	2	1	..	..	..	..
..	..	..	..	..	..	1	1	..	1	..	..	..	..	1	..
1	..	1	1	..	..	1	..	2	..	1	2	3	..	..	..
1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	2	..	..	..	..	..	..	..	..	1	..	..	..
..	3	7	7	20	14	9	7	4	1	1	..	..	..	4	..
5	4	3	9	4	4	1	1	..	1	..	..	..	..	..	..
9	12	13	9	6	3	8	5	2	2	..	..	..	..	1	..
25	36	32	16	15	4	..	..	..	..	..	..	..	..	10	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	41	46	34	15	1	..	..	..	..	..	..	..	..	4	..
6	13	13	13	2	..	..	..	..	..	..	..	..	..	1	..
14	23	31	29	11	..	..	..	..	..	..	..	..	..	4	..
70	97	63	45	15	2	..	..	..	..	..	..	..	..	10	..
34	36	29	26	13	2	..	..	..	..	..	..	..	..	7	..
..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..
2	7	2	1	..	3	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
VIII.—Diseases of Skin and Cellular Tissue.										
142. Gangrene	65	1	..	1	..	2	4	2	..	..
143. Carbuncle	4	1	1	..	..	..	2	..	..	..
144. Phlegmon, acute abscess	46	13	2	1	..	1	17	1	1	3
145. Other diseases of skin and adnexa	15	6	..	..	..	..	6	..	..	..
IX.—Diseases of Locomotory System										
146. Diseases of bones (non-tuberculous)	52	13	9	3	1	1	27	3	6	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	6	..	..	..	..	..	..	..	..	1
148. Amputation	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	1	..	..	..	..	..	..	..	..	..
X.—Malformations.										
150. Congenital malformations	240	220	9	4	..	..	233	6	..	..
XI.—Diseases of Infancy.										
151. Congenital debility, icterus and sclerema	1,529	1,527	2	..	..	..	1,529	..	..	..
151a. Injury during birth	142	142	..	..	..	..	142	..	..	..
152. Other diseases peculiar to infancy	51	51	..	..	..	..	51	..	..	..
153. Neglect	5	5	..	..	..	..	5	..	..	..
XII.—Diseases of Old Age.										
154. Senile debility	474	..	..	..	..	..	..	..	..	..
XIII.—External Causes.										
155. Suicide by poison	57	..	..	..	..	..	..	..	..	7
156. Suicide by asphyxia	37	..	..	..	..	..	..	..	..	3
157. Suicide by hanging or strangulation	15	..	..	..	..	..	..	..	..	..
158. Suicide by drowning	2	..	..	..	..	..	..	..	..	..
159. Suicide by firearms	15	..	..	..	..	..	..	..	..	1
160. Suicide by cutting instruments	6	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height	16	..	..	..	..	..	..	..	..	..
162. Suicide by crushing	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods	..	..	..	..	..	..	..	..	..	..
164. Fractures	28	1	..	1	..	1	3	..	..	1
165. Dislocations	1	..	..	..	..	..	..	..	..	..
166. Other accidental injuries	282	7	8	18	19	10	62	53	3	3
167. Burn, by fire scald	231	6	13	19	19	23	80	39	10	4
168. Burning by corrosive substances	..	..	..	..	..	..	..	..	..	..
169. Sunstroke	75	20	2	2	1	..	25	1	..	3
170. Freezing	1	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	1	..	..	1	2	4	7	7	13	5	7	9	3	1	..
..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..
..	..	2	3	..	3	1	2	6	1	2	2	1	1	1	..
1	..	..	1	2	2	..	..	1	1	1	..	..	..	2	..
1	2	1	2	2	2	1	1	..	2	2	..	..	..	3	..
..	1	1	..	1	..	..	..	2	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	64	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	1	1	18	42	74	97	93	148	6	..
7	15	8	4	3	4	1	3	3	..	..	1	1	..	..	..
3	6	2	4	6	3	4	1	4	1	..	..	..	..	..	..
3	1	1	1	3	2	1	..	2	1	..	..	..	..	..	..
..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..
3	3	4	1	..	3	..	..	..	..	..	..	..	..	1	..
..	1	1	2	2	..	..	..	..	..	..	..	..	..	..	..
1	3	4	1	..	2	2	1	..	..	1	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	..	..	4	1	4	..	6	1	..	..	3	2	..	..
..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
12	15	11	17	14	7	14	12	14	16	9	9	6	5	11	..
11	14	10	10	12	6	6	5	7	6	6	4	..	1	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	2	2	5	3	..	3	6	4	4	5	4	3	1	3	..
..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
171. Electrical shock................	1	..	..	..	..	..	..	..	..	1
172. Accidental drowning...........	30	..	1	..	1	..	2	..	4	3
173. Inanition (starvation)..........	1	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal....	117	2	1	2	4	..	9	4	7	6
175. Other acute poisoning..........	35	1	1	3	..	..	5	1	1	1
176. Other external violence........	92	14	1	2	..	1	18	3	1	4
(of which) a. Homicide by blows....	2	..	..	..	..	..	..	..	1	..
b. Homicide by sharp instruments	5	..	..	..	..	..	..	..	..	..
c. Homicide by gunshot..	20	..	..	..	..	..	..	1	..	1
d. Homicide by poison...	..	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods..............	6	..	1	..	..	..	1	1	..	..
XIV.—Ill-defined or not Specified Causes.										
177. Dropsy.........................	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal...	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes...............	532	449	65	8	5	..	527	2	..	..
I.—General diseases.............	8,562	557	446	334	224	155	1,716	400	189	389
a. Tuberculous diseases...	3,715	118	107	73	32	26	356	91	91	296
b. Cancer........	1,741	2	..	3	..	1	6	5	3	4
II.—Diseases of nervous system and organs of sense	3,528	535	200	128	89	53	1,005	257	131	92
III.—Diseases of circulatory system	3,178	50	9	4	10	7	80	73	96	87
IV.—Diseases of respiratory system	5,675	1,455	741	249	113	69	2,627	129	59	87
V.—Diseases of digestive system.	4,477	2,385	436	93	44	24	2,982	65	36	46
VI.—Diseases of genito-urinary system..................	3,170	35	10	11	9	2	67	23	26	65
VII.—Puerperal diseases...........	815	..	..	..	..	..	..	..	3	45
VIII.—Diseases of skin and cellular tissue................	130	21	3	2	..	3	29	3	1	3
IX.—Diseases of locomotory system	59	13	9	3	1	1	27	3	6	1
X.—Malformations....	240	220	9	4	..	..	233	6	..	..
XI.—Diseases of infancy...........	1,727	1,725	2	..	..		,727	..	..	..
XII.—Diseases of old age.........	474	..	..	..	..	..	..	..	..	..
XIII.—External causes....	1,042	51	27	47	44	35	204	101	26	37
a. Suicide.................	148	..	..	..	..	..	..	..	..	11
b. Homicide	33	..	1	..	..	..	1	2	1	1
c. Accident...............	861	51	26	47	44	35	203	99	25	25
XIV.—Causes ill-defined...........	532	449	65	8	5	..	527	2	..	..
Total—Females.............	33,609	7,496	1,957	883	539	349	11,224	1,062	573	852

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	3	3	6	2	2	1	1	..	..	1	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
11	17	8	6	12	8	8	4	4	3	2	2	5	1	1	..
5	1	7	2	4	2	2	1	..	1	1	1	..	..	1	..
14	13	12	12	5	4	3	..	1	1	..	..	1	..	8	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	..	1	..	..	..	..	1	..	..	..	..	..	1	..
5	3	3	2	2	1	2	..	..	..	..	..	..	..	2	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	1	1	1	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1	1	..	..	..	..	..	..	1	..	31	..
638	732	653	675	580	464	475	412	407	357	223	149	67	36	315	2
530	585	477	435	277	168	132	101	81	59	22	7	3	4	209	2
9	42	61	129	190	215	240	216	202	185	126	71	24	13	34	..
75	59	73	106	130	153	181	202	239	240	232	189	98	66	69	..
85	109	122	171	202	224	248	272	346	317	313	219	127	87	87	..
108	134	132	185	167	175	249	247	308	317	287	212	148	104	193	2
76	68	89	133	115	152	129	112	134	120	87	70	44	19	96	1
113	213	219	248	246	246	278	279	322	292	213	157	104	59	92	..
151	217	184	150	56	8	..	..	..	1	..	..	..	..	26	..
1	1	2	4	4	7	5	9	14	15	8	10	10	4	4	..
1	3	2	3	3	2	1	1	2	2	2	..	..	..	3	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	70	..
..	..	..	..	..	..	1	1	18	42	74	97	93	148	6	..
78	95	74	72	71	44	49	34	45	34	26	23	19	10	26	..
17	29	21	13	15	14	8	5	9	2	1	2	1	..	1	..
9	4	4	4	3	1	2	..	1	..	..	..	..	..	3	..
52	62	49	55	53	29	39	29	35	32	25	21	18	10	22	..
..	..	..	..	1	1	..	..	..	..	..	..	1	..	31	..
1,326	1,632	1,550	1,747	1,575	1,476	1,616	1,569	1,835	1,737	1,465	1,126	711	533	1,021	5

Total Deaths, According to Sex and

	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15	20
Borough of Manhattan.											
Males	21,690	5,122	1,334	541	320	205	7,522	559	281	446	770
Females	17,981	4,279	1,120	465	286	190	6,340	569	275	417	678
Total, both sexes	39,671	9,401	2,454	1,006	606	395	13,862	1,128	556	863	1,448
Borough of The Bronx.											
Males	3,154	503	133	64	37	29	766	88	64	93	148
Females	2,374	414	127	57	41	20	659	78	53	73	138
Total, both sexes	5,528	917	260	121	78	49	1,425	166	117	166	286
Borough of Brooklyn.											
Males	12,616	2,782	757	321	204	130	4,194	385	159	295	453
Females	11,319	2,368	618	320	181	113	3,600	350	211	312	448
Total, both sexes	23,935	5,150	1,375	641	385	243	7,794	735	370	607	901
Borough of Queens.											
Males	1,794	446	79	31	28	16	600	45	29	41	69
Females	1,397	314	72	36	25	19	466	55	27	37	48
Total, both sexes	3,191	760	151	67	53	35	1,066	100	56	78	117
Borough of Richmond.											
Males	851	173	34	10	5	11	233	17	8	12	28
Females	538	121	20	5	6	7	159	10	7	13	14
Total, both sexes	1,389	294	54	15	11	18	392	27	15	25	42
City of New York.											
Males	40,105	9,026	2,337	967	594	391	13,315	1,094	541	887	1,468
Females	33,609	7,496	1,957	883	539	349	11,224	1,062	573	852	1,326
Total, both sexes	73,714	16,522	4,294	1,850	1,133	740	24,539	2,156	1,114	1,739	2,794

Age, by Boroughs, and City, Year 1905.

25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
1,008	1,197	1,436	1,424	1,304	1,222	1,078	1,051	901	675	464	217	135	540	56
890	834	938	882	793	899	840	996	871	687	518	309	245	559	5
1,898	20,31	2,374	2,306	2,097	2,121	1,918	2,047	1,772	1,362	982	526	380	1,099	61
190	247	295	208	222	178	127	161	127	93	82	40	25	99	2
144	131	165	116	112	101	102	118	100	102	79	64	39	114	..
334	378	460	324	334	279	229	279	227	195	161	104	64	213	2
583	692	725	735	696	637	648	650	620	446	345	211	142	279	10
515	502	542	495	495	520	546	623	655	570	459	267	209	295	..
1,098	1,194	1,267	1,230	1,191	1,157	1,194	1,273	1,275	1,016	804	478	351	574	10
83	86	110	107	114	89	91	85	89	64	44	29	19	40	..
62	58	72	56	55	67	62	72	77	62	46	46	29	42	..
145	144	182	163	169	156	153	157	166	126	90	75	48	82	..
38	41	42	51	57	49	37	44	50	58	50	22	14	18	..
21	25	30	26	21	29	19	26	34	44	24	25	11	11	..
59	66	72	77	78	78	56	70	84	102	74	47	25	29	..
1,902	2,263	2,608	2,525	2,393	2,175	1,981	1,991	1,787	1,336	985	519	335	976	68
1,632	1,550	1,747	1,575	1,476	1,616	1,569	1,835	1,737	1,465	1,126	711	533	1,021	5
3,534	3,813	4,355	4,100	3,869	3,791	3,550	3,826	3,524	2,801	2,111	1,230	868	1,997	73

BOROUGH OF

Deaths of Males by Age, and Cause of Death,

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.											
1. Typhoid fever	273	158	1	2	..	3	..	6	3	6	18
2. Typhus fever	..	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever	..	..	..	..	..	..	..	..	..	..	..
4. Malarial fever	14	10	1	..	..	..	..	1	..	..	1
5. Small-pox	1	..	..	..	..	..	..	..	..	..	..
6. Measles	257	142	46	63	13	8	6	136	4	..	..
7. Scarlet fever	200	97	10	10	14	15	12	61	20	7	2
8. Whooping cough	208	91	43	27	12	4	2	88	3	..	..
9. Diphtheria and croup	660	345	59	89	69	49	24	290	44	6	..
10. Influenza	116	64	6	3	3	1	..	13	..	..	..
11. Miliary fever	..	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..	..
14. Dysentery	41	16	1	1	..	..	1	3	..	..	..
15. Plague	..	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	..	..	..	..	..	..	..	..	..	..	..
17. Leprosy	1	1	..	..	..	..	..	..	..	..	..
18. Erysipelas	179	104	39	2	1	..	..	42	..	..	4
19. Other epidemic diseases	3	2	2	..	..	..	..	2	..	..	..
20. Pyæmia, septicæmia	45	25	11	1	..	..	..	12	..	..	1
21. Glanders	2	1	..	..	..	..	..	..	..	..	..
22. Malignant pustule	..	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia	2	2	..	..	1	..	..	1	..	..	..
24. Actinomycosis	2	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	13	9	..	..	..	..	..	..	..	..	..
27. Tuberculosis of lungs	4,237	2,674	33	15	13	7	4	72	9	8	108
28. Tubercular meningitis	391	211	51	44	32	18	7	152	22	3	5
29. Abdominal tuberculosis	90	41	4	4	2	1	1	12	7	..	1
30. Pott's disease	26	14	..	..	..	1	..	1	1	5	1
31. Cold abscess	4	2	..	..	1	..	..	1	..	..	..
32. White swelling	24	14	1	..	..	..	..	1	4	4	1
33. Tuberculosis of other organs	33	22	2	1	..	..	..	3	2	1	1

MANHATTAN.

for the Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
29	22	26	15	12	12	5	1	2	1	..	..	..	..	2	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	1	1	1	..	..	1	1	1	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..
5	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	..
1	..	4	..	..	..	..	..	..	..	..	..	..	..	3	..
1	3	2	4	6	5	6	4	7	2	1	6	4	..	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	1	..	1	1	1	2	2	4	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1
2	3	3	6	10	7	11	2	8	1	3	2	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	1	4	2	2	..	..	..	..	..	1	..	..	..	..
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	..	..	..	1	3	1	1	1	..	..	..	..	..	2	..
230	349	393	431	351	278	197	106	74	38	20	8	2	..	103	34
6	5	4	3	6	2	2	..	..	1	..	..	..	..	5	..
4	3	1	2	5	2	1	..	1	1	..	1	..	..	2	..
1	..	1	..	1	1	..	1	..	1	..	..	..	..	1	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
..	..	..	1	1	1	..	..	1	..	..	..	..	..	..	..
..	1	2	1	1	3	2	1	1	1	1	1	..	..	..	..

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
34. General tuberculosis...	16	8	..	2	1	..	1	4	1	..	..
35. Scrofula...............	..	1	1	..	..	..	..	1	..	..	..
36. Syphilis...............	149	90	56	6	..	..	..	62	..	2	..
37. Gonorrhœa (adults)...	9	7	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children).	2	..	..	..	..	..	..	..	..	..	..
39. Cancer, etc., of the mouth.............	69	58	..	..	..	..	..	..	1	..	..
40. Cancer of stomach, liver...............	629	329	..	..	..	..	..	..	..	..	1
41. Cancer of intestines, rectum............	254	117	..	..	1	..	..	1	1	..	1
42. Cancer of female genital organs.....	254	..	..	..	..	..	..	..	..	..	..
43. Cancer of the breast...	137	1	..	..	..	..	..	..	..	..	..
44. Cancer of the skin.....	56	44	..	..	..	..	..	..	..	1	..
45. Cancer of other organs and unspecified................	250	143	1	1	..	1	..	3	1	..	5
46. Other tumors (except of female genital organs)............	35	14	1	..	..	..	..	1	..	..	..
47. Acute articular rheumatism............	194	103	5	..	2	1	1	9	13	5	9
48. Chronic rheumatism and gout...........	69	31	..	1	..	..	..	1	1	1	2
49. Scurvy.................	7	5	5	..	..	..	..	5	..	..	..
50. Diabetes...............	321	141	..	..	..	..	..	..	..	1	3
51. Exophthalmic goitre..	14	3	1	..	..	..	..	1	..	..	..
52. Addison's disease......	8	4	..	..	..	..	..	..	..	..	1
53. Leukæmia.............	41	22	1	1	..	..	..	2	2	..	2
54. Anæmia, chlorosis.....	52	16	..	..	..	..	..	..	..	..	2
55. Other general diseases.	1	1	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic.......	396	304	..	..	..	..	..	..	2	1	..
57. Lead poisoning.......	3	3	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	2	2	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings...............	12	4	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.											
60. Encephalitis..........	4	1	1	..	..	..	..	1	..	..	..
61. Simple meningitis.....	1,709	924	195	100	83	66	49	493	155	63	49
(of which) Cerebro-spinal meningitis.	1,423	774	147	78	69	61	43	398	142	59	48
62. Locomotor ataxia.....	43	35	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal chord......	61	29	..	..	..	..	..	..	1	..	1
64. Apoplexy, congestion of brain......	1,262	647	7	1	..	..	..	8	1	1	..
65. Softening of brain.....	24	15	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified..	106	39	..	2	1	..	1	4	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	8	4	1	8	2	2	1	..	..	..	..	..	6	..
1	..	2	1	..	1	1	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	..	3	6	9	2	9	11	5	6	3	..	..	..	..
..	4	6	21	33	38	36	62	40	37	32	16	3	..	..	..
6	4	6	6	7	10	20	13	9	13	8	8	3	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
..	1	..	5	5	5	7	4	6	4	3	2	1	..	..	..
4	4	4	5	11	14	12	15	25	19	12	6	3	..	..	1
..	..	1	4	3	..	2	..	1	1	..	1	..	..	..	..
4	8	3	10	6	5	6	12	4	5	1	2	1	..	..	..
..	1	..	2	1	2	2	4	1	4	3	5	..	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	7	3	9	9	10	19	21	16	20	11	6	2	1	..	..
..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..
1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..
1	2	2	..	2	2	3	1	1	1	1	..	..	..	..	..
1	1	..	1	2	1	2	..	2	1	2	1	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
5	35	48	49	56	42	25	18	6	13	3	1	..	..	1	..
2	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	1	..	1	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	28	25	21	16	6	13	4	2	3	1	..	..	..	17	..
38	25	19	17	10	3	11	3	..	1	..	..	..	..	12	..
..	1	..	2	3	5	8	5	7	1	2	1	..	..	1	..
2	..	1	2	4	2	1	4	3	3	3	..	2	..	..	..
3	10	15	23	33	60	81	73	91	87	78	44	30	9	11	1
..	..	..	2	2	..	2	1	..	2	3	2	1	..	..	..
..	1	..	3	1	1	1	2	7	9	5	3	1	1	..	..

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
67. General paresis	119	99	..	..	..	..	..	..	..	..	..
68. Other forms of insanity	14	7	..	..	..	..	..	..	..	..	..
69. Epilepsy	58	40	7	..	1	1	..	9	2	..	4
70. Convulsions (not puerperal)	3	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants	453	237	170	35	19	6	3	233	4	..	..
72. Tetanus, trismus	31	27	6	..	..	..	1	7	2	1	2
73. Chorea	6	3	..	..	..	..	..	..	1	..	1
74. Other nervous diseases	109	57	1	1	..	1	..	3	6	1	2
75. Diseases of the eyes...	2	2	2	..	..	..	..	2	..	..	..
76. Diseases of the ears...	125	72	12	5	2	1	1	21	1	6	1
III.—Diseases of Circulatory System.											
77. Pericarditis	35	20	..	..	1	..	..	1	1	1	1
78. Acute endocarditis....	112	53	1	..	..	..	2	3	7	3	..
79. Organic heart diseases	1,730	1,339	4	2	5	1	4	16	15	30	32
80. Angina pectoris	79	54	..	..	..	..	..	..	1	..	..
81. Diseases of arteries, aneurism, etc	244	142	..	..	1	..	..	1	..	1	..
82. Embolism, thrombosis	85	44	..	..	1	..	..	1	..	..	1
83. Diseases of veins, (hæmorrhoids, varices, phlebitis, etc.)	16	6	1	..	..	..	..	1	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	20	13	7	1	2	..	..	10	1	..	..
85. Hæmorrhage	56	24	16	..	..	..	..	16	..	1	..
86. Other diseases of circulatory system...	..	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.											
87. Diseases of the nasal fossæ....	..	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx.	21	8	2	1	2	..	..	5	..	..	..
89. Diseases of thyroid gland..............	5	2	1	..	..	..	..	1	..	..	..
90. Acute bronchitis......	821	395	243	70	16	5	4	338	3	1	..
91. Chronic bronchitis....	78	39	..	..	1	..	..	1	..	..	..
92. Broncho-pneumonia...	2,889	1,522	710	370	113	47	26	1,266	34	5	7
93. Pneumonia............	2,733	1,573	88	70	27	13	6	204	18	16	34
94. Pleurisy................	188	119	14	15	6	2	2	39	5	4	4
95. Congestion of lungs, pulmonary apoplexy	71	28	10	2	..	..	..	12	..	..	..
96. Gangrene of lung......	16	9	1	..	1	..	..	2	..	..	1
97. Asthma	86	53	..	..	..	..	..	..	..	1	..
98. Pulmonaryemphysema	57	35	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisisexcepted)	31	18	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	3	11	17	26	19	12	2	4	1	2	1	1	..	1	..
1	..	1	1	1	..	1	..	..	1	..	..	1	..	..	..
2	4	3	1	3	2	3	1	4	1	..	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	..
3	2	1	..	2	1	4	1	1	..	..	..	..	..	..	..
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
6	7	5	7	4	6	1	3	1	..	3	1	1	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	5	2	3	5	5	3	1	4	3	2	..	..	..	..	..
1	2	..	..	2	2	1	3	3	1	1	..	..	..	..	..
4	5	2	7	1	5	2	4	5	3	2	..	..	..	1	..
45	51	66	97	110	108	141	131	146	139	90	73	31	18	33	3
..	..	2	5	4	4	4	3	12	8	5	6	..	..	..	..
1	3	5	6	9	17	7	10	16	16	15	12	15	8	4	..
1	..	2	..	6	6	9	1	1	6	6	1	2	1	1	..
1	..	..	..	1	..	2	..	..	1	..	..	..	..	..	..
..	..	..	..	..	1	..	..	..	1	..	..	..	..	2	..
2	..	1	1	..	2	..	..	..	..	1	..	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
2	..	..	1	2	2	3	4	11	8	6	4	5	5	17	..
..	1	1	2	1	..	3	5	7	4	4	5	2	3	..	..
12	10	13	20	15	12	18	25	15	24	18	12	9	7	47	..
63	114	113	159	164	129	130	97	124	80	63	44	12	9	52	3
7	4	4	10		14	6	4	..	6	3	1	..	..	2	..
..	1	1	1	2	1	1	1	1	2	..	3	..	2	1	..
..	..	2	..	..	..	1	2	..	1	..	..	..	..	..	..
..	..	1	1	2	4	7	9	6	8	7	4	2	1	..	..
..	..	..	1	2	3	4	6	5	7	1	4	1	1	..	..
..	3	4	3	2	1	1	2	1	..	..	..	..	1	1	..

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
V.—Diseases of Digestive System.											
100. Diseases of mouth and adnexa......	10	3	1	1	..	..	..	2	..	..	..
101. Diseases of pharynx..	32	18	7	4	2	..	..	13	..	..	..
102. Diseases of œsophagus	..	..	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach.....	77	50	..	..	..	..	..	..	..	..	1
104. Other diseases of stomach (cancer excepted)........	132	64	1	2	..	3	1	7	2	..	..
105. Diarrhœa and enteritis (under two years)...........	3,103	1,643	1,373	270	..	..	..	1,643	..	..	..
(of which) chronic diarrhœa.........	..	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over).........	370	170	..	..	40	17	14	71	10	5	3
107. Intestinal parasites ..	4	3	..	..	1	..	..	1	..	..	..
108. Hernia, intestinal obstruction........	323	146	38	..	1	1	..	40	1	4	6
109. Other diseases of intestines............	21	11	1	1	..	..	..	2	..	..	1
110. Acute yellow atrophy of liver........	7	1	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver...............	5	4	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver.....	483	304	..	..	..	..	1	1	..	..	..
113. Biliary calculi	83	28	1	..	..	..	..	1	..	..	..
114. Other diseases of liver...............	90	54	3	1	..	..	..	4	1	1	1
115. Diseases of spleen....	2	1	..	1	..	..	..	1	..	..	..
116. Simple peritonitis (non-puerperal)....	56	30	4	..	..	..	..	4	1	1	1
117. Other diseases of digestive system (except tuberculosis and cancer)........	12	6	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess.......	292	189	1	..	..	2	3	6	13	22	18
VI.—Diseases of Genito-urinary System.											
119. Acute nephritis.......	372	186	16	10	6	2	4	38	9	3	5
120. Bright's disease.......	2,832	1,506	1	..	1	..	..	2	3	5	12
121. Other diseases of kidneys and adnexa...	53	34	1	..	..	..	..	1	..	1	1
122. Urinary calculus......	8	7	..	1	..	..	..	1	..	..	..
123. Diseases of bladder...	29	23	..	..	..	..	..	..	..	..	1
124. Diseases of urethra, urinary abscess, etc.................	21	21	..	..	..	..	..	..	..	1	..
125. Diseases of the prostate	33	33	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs.........	1	1	..	..	..	..	..	..	..	..	..
127. Metritis...............	2	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)....	4	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer)............	48	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus..............	24	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
..	1	1	..	..	2	..	..	..	..	..	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	2	6	4	8	6	6	4	5	2	1	2	..	..	2	1
1	1	3	3	6	6	5	7	5	3	3	7	4	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	43	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	3	3	10	9	6	4	6	7	6	9	5	6	1	3	..
1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
6	4	4	11	8	12	9	11	9	8	6	3	3	1	4	..
..	..	..	..	1	..	..	2	..	3	2	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
1	1	..	..	1	1	..	..	..	..	..	..	..	..	..	..
..	11	23	32	27	48	56	35	36	19	8	6	2	..	4	1
..	..	1	2	4	2	4	6	3	3	1	1	..	..	..	..
..	6	4	2	2	8	5	5	3	5	4	2	1	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	3	..	3	4	1	3	3	..	..	..	..	..	..	1	..
..	..	2	1	2	1	..	..	..	..	..	..	..	..	..	..
20	15	25	16	21	7	7	6	9	2	1	1	..	..	1	..
5	16	16	15	17	10	11	8	11	9	7	3	1	2	2	..
26	50	85	100	117	148	148	196	168	158	128	97	33	30	29	5
1	1	2	3	2	2	1	4	5	4	3	2	1	..	..	..
..	..	..	1	1	2	1	..	1	..	..	..	..	..	..	..
1	..	..	..	..	2	2	1	4	1	4	2	2	3	..	..
..	1	2	4	2	1	3	1	3	1	2	..	..	..	1	..
..	..	..	..	1	..	1	3	5	6	6	8	3	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
131. Ovarian cysts and tumors	36	..	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs	97	..	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal or cancer)	1	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.											
134. Accidents of pregnancy	99	..	..	..	..	..	..	..	..	..	..
135. Puerperal hæmorrhage	24	..	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	66	..	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia	151	..	..	..	..	..	..	..	..	..	..
138. Puerperal albuminuria and convulsions	80	..	..	..	..	..	..	..	..	..	..
139. Puerperal phlegmasia alba dolens	1	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	4	..	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast	..	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.											
142. Gangrene	47	16	1	..	..	..	..	1	..	..	1
143. Carbuncle	11	7	2	..	..	..	..	2	..	..	..
144. Phlegmon, acute abscess	70	35	7	..	..	..	..	7	3	..	1
145. Other diseases of skin and adnexa	20	12	5	..	..	..	1	6	..	..	..
IX.—Diseases of Locomotory System.											
146. Diseases of bones (non-tuberculous	60	35	8	8	3	1	1	21	3	2	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	8	3	..	1	..	..	..	1	1	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	1	..	..	..	..	..	..	..	..	..	..
X.—Malformations.											
150. Congenital malformations	286	167	142	10	4	4	..	160	4	2	1
XI.—Diseases of Infancy.											
151. Congenital debility, icterus and sclerema	2,117	1,174	1,169	3	1	1	..	1,174	..	..	..
151a. Injury during birth	203	115	114	1	..	..	..	115	..	..	..
152. Other diseases peculiar to infancy	15	10	10	..	..	..	..	10	..	..	..
153. Neglect	1	..	..	..	..	..	..	..	..	..	..
XII.—Diseases of Old Age.											
154. Senile debility	244	75	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and ver.	Colored.	Chinese.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	1	..	1	1	..	1	1	3	4	..	1	..	..	..
..	..	1	1	..	..	1	..	1	..	..	1	..	..	..	..
3	2	3	4	..	3	2	1	..	..	4	1	1	..	..	..
..	..	..	..	1	..	..	..	..	3	1	1	..	..	..	..
1	1	1	..	1	..	1	1	1	..	2	..	..	..	2	..
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	55	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	4	6	14	18	11	22	1	..

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
XIII.—External Causes.											
155. Suicide by poison.....	73	42	..	..	..	..	..	..	..	..	1
156. Suicide by asphyxia ..	94	70	..	..	..	..	..	..	..	..	2
157. Suicide by hanging or strangulation ..	37	31	..	..	..	..	..	..	..	..	..
158. Suicide by drowning..	4	2	..	..	..	..	..	..	..	..	..
159. Suicide by firearms ...	118	108	..	..	..	..	..	..	..	..	5
160. Suicide by cutting instruments	21	17	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height..	26	17	..	..	..	..	..	..	..	..	..
162. Suicide by crushing...	6	6	..	..	..	..	..	..	..	..	..
163. Suicide by other methods..........	..	..	..	..	..	..	..	..	..	..	..
164. Fractures.............	87	74	..	..	1	1	..	2	2	..	4
165. Dislocations..........	3	2	..	..	..	..	..	..	..	..	..
166. Other accidental injuries..............	1,025	838	2	8	12	15	12	49	69	28	43
167. Burns, by fire, scald..	204	89	3	13	15	13	5	49	9	1	2
168. Burning by corrosive substances........	..	..	..	..	..	..	..	..	..	..	..
169. Sunstroke.............	134	86	16	3	2	2	2	25	1	1	..
170. Freezing..............	..	..	..	..	..	..	..	..	..	..	..
171. Electrical shock......	6	5	..	..	..	..	..	..	..	..	..
172. Accidental drowning..	251	238	2	..	1	..	2	5	19	10	12
173. Inanition (starvation)	2	1	1	..	..	..	..	1	..	..	..
174. Inhalation of noxious gas, not suicidal..............	248	163	3	1	..	1	..	5	4	5	9
175. Other acute poisoning	64	37	4	..	2	..	1	7	3	..	1
176. Other external violence	192	134	38	..	1	2	..	41	2	3	5
(Of which) a. Homicide, by blows.	19	17	1	..	..	..	..	1	..	1	..
b. Homicide, by sharp instruments	18	13	..	..	..	..	..	..	..	..	2
c. Homicide, by gunshot	48	39	..	..	..	..	..	..	..	..	2
d. Homocide, by poisoning...........	1	1	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods.........	5	1	..	..	..	..	..	..	1	..	..
XIV.—Ill-defined or Not Specified Causes.											
177. Dropsy................	..	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal..........	..	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes.....	600	319	267	47	1	3	..	318	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
3	3	9	5	4	5	4	7	..	1	..	..	..	..	2	..
8	5	9	10	12	6	5	3	5	3	2	..	..	..	..	..
..	2	3	7	6	..	3	1	4	2	2	..	1	..	..	..
1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
12	14	15	9	8	13	7	7	8	6	4	..	..	..	1	..
..	..	4	1	2	4	1	..	3	2	..	..	..	..	..	..
3	4	3	4	1	..	2	..	..	..	..	..	..	..	..	..
1	..	1	2	..	1	..	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	5	5	10	15	6	3	3	4	2	4	..	..	1	1	..
..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..
77	76	91	103	76	61	49	39	26	26	12	5	8	..	11	..
2	2	7	4	5	4	1	2	..	..	..	..	1	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	3	5	6	11	8	5	5	4	2	5	2	..	1	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	..	1	..	..	..	1	..	..	..	..	..	..	..	..
19	24	21	37	21	20	14	11	4	9	2	..	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	12	21	17	25	17	11	9	4	5	4	2	..	..	1	..
1	4	4	2	3	3	3	..	4	2	..	..	..	..	..	..
14	10	9	16	15	5	4	4	5	..	..	..	1	..	9	6
..	..	1	3	4	1	3	1	2	..	..	..	..	..	1	1
3	1	1	2	2	2	..	..	..	..	..	..	..	..	..	..
9	8	5	10	3	1	..	1	..	..	..	..	..	..	7	5
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	15	..

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases..	9,803	5,496	381	273	165	109	59	987	141	51	169
a. Tuberculous diseases	4,834	2,995	91	66	49	27	13	246	46	21	117
b. Cancer	1,649	692	1	1	1	1	..	4	3	1	7
II.—Diseases of nervous system and organs of sense	4,129	2,234	401	144	106	75	55	781	173	72	60
III.—Diseases of circulatory system..	3,377	1,695	29	3	10	1	6	49	25	36	34
IV.—Diseases of respiratory system...	6,996	3,801	1,069	528	166	67	38	1,868	60	27	46
V.—Diseases of digestive system....	5,102	2,725	1,430	280	44	23	19	1,796	28	33	31
VI.—Diseases of genito-urinary system............	3,561	1,811	18	11	7	2	4	42	12	10	19
VII.—Puerperal diseases.	425	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of skin and cellular tissue.............	148	70	15	..	..	..	1	16	3	..	2
IX.—Diseases of locomotory system.	69	38	8	9	3	1	1	22	4	2	..
X.—Malformations.....	286	167	142	10	4	4	..	160	4	2	1
XI.—Diseases of infancy	2,336	1,299	1,293	4	1	1	..	1,299	..	..	..
XII.—Diseases of old age	244	75	..	..	..	..	..	..	..	..	..
XIII.—External causes....	2,595	1,960	69	25	34	34	22	184	109	48	84
a. Suicide	379	293	..	..	..	..	..	..	..	..	8
b. Homicide.......	91	71	1	..	..	..	..	1	1	1	4
c. Accident........	2,125	1,596	68	25	34	34	22	183	108	47	72
XIV.—Causes ill-defined..	600	319	267	47	1	3	..	318	..	..	..
Total males.....	..	21,690	5,122	1,334	541	320	205	7,522	559	281	446
Total females...	..	17,981	4,279	1,120	465	286	190	6,340	569	275	417
Total both sexes	..	39,671	9,401	2,454	1,006	606	395	13,862	1,128	556	863

Deaths of Females by Age, and Cause of Death,

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.										
1. Typhoid fever..................	115	..	..	..	2	2	4	8	8	12
2. Typhus fever..................	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever................	..	..	..	..	..	..	..	..	..	..
4. Malarial fever..................	4	1	..	..	..	..	1	..	..	1
5. Small-pox	1	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
311	467	524	593	543	464	367	279	221	171	108	72	21	7	136	36
243	359	402	438	367	290	203	109	79	42	21	10	2	..	113	34
11	15	16	40	63	76	77	103	91	78	61	35	10	1	..	1
72	61	64	82	100	107	131	97	124	111	99	53	37	10	39	1
55	61	78	116	133	145	166	152	183	175	120	92	48	27	42	3
85	133	140	198	198	166	174	156	170	141	102	77	31	29	120	3
44	47	73	85	93	100	99	85	77	52	35	28	16	3	59	2
33	69	105	123	140	165	167	213	197	179	150	112	40	35	32	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	2	5	5	2	4	3	2	2	6	9	3	2	..	..	..
1	1	1	..	1	..	2	1	1	..	2	..	..	..	2	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	60	..
..	..	..	..	..	..	..	..	4	6	14	18	11	22	1	..
165	166	207	234	214	153	113	93	72	60	36	9	11	2	30	6
28	28	44	38	33	29	23	19	20	14	8	..	1	..	3	..
13	9	7	15	9	4	3	2	2	..	..	..	..	..	8	6
124	129	156	181	172	120	87	72	50	46	28	9	10	2	19	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	15	..
770	1,008	1,197	1,436	1,424	1,304	1,222	1,078	1,051	901	675	464	217	135	540	56
678	890	834	938	882	793	899	840	996	871	687	518	309	245	559	5
1,448	1,898	2,031	2,374	2,306	2,097	2,121	1,918	2,047	1,772	1,362	982	526	380	1,099	61

for Year ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
19	15	18	9	9	2	2	3	2	1	1	2	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
6. Measles	115	27	50	12	12	6	107	6	1	..
7. Scarlet fever	103	3	11	20	14	12	60	31	2	2
8. Whooping cough	117	56	31	9	10	7	113	3	..	..
9. Diphtheria and croup	315	43	76	61	45	28	253	47	5	2
10. Influenza	52	2	1	1	..	..	4	..	2	..
11. Miliary fever	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..
14. Dysentery	25	2	..	..	..	1	3	1	1	1
15. Plague	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	..	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..
18. Erysipelas	75	44	1	..	..	..	45	..	1	1
19. Other epidemic diseases	1	1	..	..	..	..	1	..	..	..
20. Pyæmia, septicæmia	20	15	..	..	..	..	15	1	1	1
21. Glanders	1	..	..	..	..	..	..	..	..	..
22. Malignant pustule	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia	..	..	..	..	..	..	..	..	..	..
24. Actinomycosis	2	..	..	..	..	..	..	..	1	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larnyx	4	..	..	..	..	..	..	..	..	..
27. Tuberculosis of lungs	1,563	12	22	10	3	4	51	24	31	112
28. Tubercular meningitis	180	46	34	31	15	10	136	24	4	3
29. Abdominal tuberculosis	49	10	1	2	..	1	14	3	..	2
30. Pott's disease	12	..	..	1	..	..	1	5	1	..
31. Cold abscess	2	..	1	..	..	..	1	..	..	..
32. White swelling	10	..	..	1	1	..	2	..	2	..
33. Tuberculosis of other organs	11	..	..	..	..	..	..	2	..	..
34. General tuberculosis	8	3	1	..	..	..	4	..	..	..
35. Scrofula	..	..	..	..	..	..	..	..	..	..
36. Syphilis	59	30	1	1	..	..	32	2	..	2
37. Gonorrhœa (adults)	2	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children)	2	2	..	..	..	..	2	..	..	..
39. Cancers, etc., of the mouth	11	..	..	..	..	..	..	..	..	..
40. Cancer of stomach, liver	300	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum	137	..	..	..	..	..	..	..	..	1

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
1	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..
2	3	..	2	..	..	..	..	..	..	..	..	..	..	2	..
..	..	..	..	1	..	..	..	..	..	..	..	..	..	5	..
2	1	2	..	2	..	..	..	..	1	..	..	..	..	2	..
2	2	2	2	3	1	2	4	6	9	2	3	6	2	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	1	1	2	2	..	..	1	3	3	..	2	4	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	2	..	5	5	3	1	4	2	2	..	1	..	..	..
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..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	1	..	..	..	..	1	..	..	..	..	..	..	..	..
239	264	229	202	128	82	65	47	44	27	12	4	1	1	97	2
4	2	3	1	1	2	..	..	..	..	..	..	..	..	11	..
7	5	2	6	4	2	1	..	2	1	..	..	..	..	5	..
..	3	..	1	1	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	1	1	..	2	1	..	..	..	..	..	..	..	..	..
3	..	..	3	..	1	..	..	1	..	..	..	1	..	..	..
..	2	..	1	..	..	..	..	..	..	..	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	4	4	4	1	3	1	..	..	1	..	1	..	..	7	..
..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	1	..	1	2	4	1	..	1	..	..	..	..	..
1	6	2	25	28	29	35	46	48	40	25	12	3	..	4	..
1	1	4	14	15	12	21	16	18	15	10	7	2	..	3	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
42. Cancer of female genital organs	254	..	..	..	..	..	..	..	..	..
43. Cancer of the breast............	136	..	..	..	..	..	..	..	..	..
44. Cancer of the skin..............	12	1	..	..	..	..	1	..	..	..
45. Cancer of other organs and unspecified..................	107	1	..	1	..	1	3	3	1	2
46. Other tumors (except of female genital organs)..............	21	2	..	..	..	..	2	1	..	1
47. Acute articular rheumatism....	91	3	..	1	3	1	8	9	7	6
48. Chronic rheumatism and gout..	38	..	..	..	..	..	..	1	2	..
49. Scurvy..........................	2	1	..	..	..	..	1	..	..	..
50. Diabetes........................	180	..	..	1	..	..	1	..	..	3
51. Exophthalmic goitre............	11	..	..	..	..	..	..	..	..	..
52. Addison's disease..............	4	..	..	..	..	..	..	..	..	..
53. Leukæmia......................	19	2	..	..	..	1	3	1	1	1
54. Anæmia, chlorosis..............	36	1	..	..	..	..	1	..	1	2
55. Other general diseases..........	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic..	92	..	..	..	..	..	..	..	..	1
57. Lead poisoning.................	..	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation..................	..	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings.......	8	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.										
60. Encephalitis....................	3	..	..	..	1	..	1	..	..	..
61. Simple meningitis..............	785	133	84	70	44	30	361	156	76	57
61a. (of which) Cerebro-spinal Meningitis	649	83	65	56	38	29	271	142	71	53
62. Locomotor ataxia...............	8	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord...	32	..	..	1	..	1	2	1	1	3
64. Apoplexy, congestion of brain..	615	6	..	..	..	..	6	1	1	..
65. Softening of brain..............	9	1	..	..	..	..	1	..	..	..
66. Paralysis unspecified...........	67	2	1	..	..	..	3	1	..	..
67. General paresis.................	20	..	..	..	..	..	..	..	..	..
68. Other forms of insanity........	7	..	..	..	..	..	..	..	..	..
69. Epilepsy........................	18	..	2	1	..	..	3	..	..	..
70. Convulsions (not puerperal)....	3	..	..	..	..	..	..	1	1	..
71. Convulsions of infants..........	216	166	32	8	6	3	215	1	..	..
72. Tetanus, trismus...............	4	3	..	..	..	..	3	..	1	..
73. Chorea..........................	3	..	..	..	..	..	..	2	..	1
74. Other nervous diseases..........	52	1	..	1	1	2	5	2	2	6
75. Diseases of the eyes............	..	..	..	..	..	..	..	..	..	..
76. Diseases of the ears............	53	11	9	3	6	2	31	1	3	1

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
..	9	15	23	32	50	44	30	18	20	8	4	..	1	8	..
..	3	6	11	16	14	18	19	15	14	7	9	2	2	1	..
..	1	..	..	2	..	2	1	2	1	1	..	..	1	..	..
4	6	5	5	7	9	9	13	14	8	10	2	4	2	1	..
..	1	1	2	1	2	1	2	2	3	1	1	..	..	1	..
5	6	8	6	3	2	8	8	7	2	..	4	2	..	4	..
1	1	3	2	2	1	2	3	7	5	5	1	1	1	1	..
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
2	4	4	7	14	14	18	21	27	26	21	13	3	2	1	..
1	4	..	1	2	..	2	..	..	..	..	..	..	1	..	..
..	..	2	..	..	2	..	..	..	..	..	..	..	..	..	..
..	2	2	1	3	..	..	1	2	1	..	1	..	..	1	..
1	2	2	3	4	4	6	2	1	5	2	..	..	..	2	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	14	14	16	17	10	9	3	..	1	..	2	..	..	..	..
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..	3	1	1	..	1	1	..	..	..	1	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..
35	20	17	21	18	10	1	3	8	2	..	..	..	..	13	..
32	17	13	14	16	9	1	3	5	2	..	..	..	..	11	..
..	1	..	..	..	1	3	1	..	..	2	..	..	..	..	..
2	1	2	4	1	2	1	1	4	1	3	..	1	2	1	..
..	7	8	21	40	46	74	75	81	77	68	52	35	23	14	..
..	..	..	..	..	..	..	4	..	1	3	..	..	..	..	..
..	1	1	3	1	2	6	8	9	11	11	4	2	4	3	..
..	2	3	4	2	2	1	1	1	..	2	1	1	..	..	..
..	2	..	..	1	1	1	..	1	1	..	..	..	..	..	..
2	2	3	4	2	..	..	1	..	..	..	1	..	..	..	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	5	4	5	4	6	4	3	1	..	..	3	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	3	2	..	3	1	2	3	..	..	..	..	..	1	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
III.—Diseases of Circulatory System										
77. Pericarditis	15	1	..	1	..	..	2	..	..	1
78. Acute endocarditis	59	3	..	..	2	1	6	12	2	4
79. Organic heart diseases	1,391	5	4	1	2	1	13	32	44	37
80. Angina pectoris	25	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc	102	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis	41	..	..	..	..	..	..	..	..	1
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	10	1	..	..	..	1	2	..	..	..
84. Diseases of lymphatic (lymphangitis, etc.)	7	5	1	..	..	..	6	1	..	..
85. Hæmorrhage	32	22	..	..	1	..	23	..	1	..
86. Other diseases of circulatory system	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.										
87. Diseases of the Nasal Fossæ	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx	13	2	6	3	1	..	12	..	..	..
89. Diseases of thyroid gland	3	..	..	..	..	..	..	..	..	..
90. Acute bronchitis	426	218	64	13	10	2	307	10	4	3
91. Chronic bronchitis	39	2	..	..	..	..	2	..	..	1
92. Broncho-pneumonia	1,367	557	341	93	41	27	1,059	34	8	7
93. Pneumonia	1,160	66	54	25	12	9	166	20	15	26
94. Pleurisy	69	11	4	4	1	2	22	..	1	1
95. Congestion of lungs, pulmonary apoplexy	43	9	..	..	1	..	10	..	..	..
96. Gangrene of lung	7	..	..	1	..	..	1	..	..	..
97. Asthma	33	..	..	..	..	..	..	..	..	..
98. Pulmonary emphysema	22	1	..	..	..	..	1	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	13	..	..	..	..	..	..	..	..	..
V.—Diseases of Digestive System.										
100. Diseases of mouth and adnexa	7	2	1	2	..	..	5	..	1	1
101. Diseases of pharynx	14	6	1	1	..	..	8	1	1	1
102. Diseases of œsophagus	..	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach	27	1	..	..	..	..	1	1	..	2
104. Other diseases of stomach (cancer excepted)	68	9	1	2	1	1	14	2	..	1
105. Diarrhœa and enteritis (under two years)	1,460	1,238	222	..	..	..	1,460	..	..	..
(of which) chronic diarrhœa	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over)	200	..	..	35	16	13	64	9	1	4
107. Intestinal parasites	1	..	..	..	..	..	..	..	..	..
108. Hernia, intestinal obstruction	177	14	4	1	2	..	21	3	1	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
2	2	1	3	..	2	..	..	1	..	..	1	..	..	6	..
2	2	5	4	4	1	2	4	1	5	3	1	..	1	5	..
35	61	59	81	96	113	127	129	158	129	116	92	40	29	37	..
..	..	2	1	..	..	2	1	4	8	5	2	..	..	..	..
2	..	..	3	4	2	6	6	12	10	18	13	12	14	3	..
3	..	5	2	1	3	3	3	8	6	2	2	1	1	1	..
1	1	..	..	2	1	2	1	..	..	..	..	..	..	...	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	..	..	1	2	1	..	1	..	..	..	..	..	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	..	..	..	..	1	..	..	1	..	..	..	..
1	2	..	1	1	1	13	7	7	21	12	11	9	16	19	..
..	..	1	..	1	1	2	3	4	4	8	6	2	4	1	..
8	8	16	9	16	20	15	20	27	34	22	29	16	19	50	..
37	47	47	78	71	71	99	101	113	88	82	51	27	21	41	2
4	7	3	2	9	2	2	3	7	2	1	2	1	..	1	..
1	..	..	..	..	..	1	3	4	2	9	6	4	3	2	..
..	..	1	1	1	1	2	..	..	..	..	..	..	..	..	..
..	1	..	2	1	..	5	4	6	7	4	2	..	1	..	..
..	1	..	..	2	..	3	1	5	3	3	2	1	..	..	..
2	1	1	2	1	1	..	1	2	1	..	..	..	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	1	7	2	..	3	1	2	2	2	1	..	..	..	..
..	3	..	3	3	6	8	3	3	8	3	6	3	4	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	37	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	4	7	8	6	3	8	10	15	20	13	12	5	6	4	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
13	3	9	17	20	22	14	11	18	9	5	5	6	..	3	..

Cause of Death.	All Ages.	Under 1 year.	1	2	3	4	Total Under 5.	5	10	15
109. Other diseases of intestines....	10	..	..	..	..	1	1	..	..	2
110. Acute yellow atrophy of liver...	6	1	..	..	..	..	1	..	..	1
111. Hydatid tumor of liver.........	1	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver...............	179	..	..	..	1	..	1	..	2	2
113. Biliary calculi....................	55	2	..	1	..	..	3	..	..	1
114. Other diseases of liver..........	36	1	..	..	..	..	1	2	..	..
115. Diseases of spleen..............	1	1	..	..	..	..	1	..	..	..
116. Simple peritonitis (non-puerperal)	26	1	..	..	..	..	1	2	..	1
117. Other diseases of digestive system (except tuberculosis and cancer)	6	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess..	103	..	..	1	1	1	3	19	9	11
VI.—Diseases of Genito-urinary System.										
119. Acute nephritis.................	186	17	4	7	4	1	33	6	6	13
120. Bright's disease.................	1,326	5	1	..	..	..	6	2	5	14
121. Other diseases of kidneys and adnexa	19	1	..	..	..	..	1	..	..	1
122. Urinary calculus................	1	..	..	..	..	..	..	..	..	..
123. Diseases of bladder.............	6	1	..	..	..	..	1	..	..	..
124. Diseases of urethra, urinary abscess, etc..................	..	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate.........	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs...............	..	..	..	..	..	..	..	..	..	..
127. Metritis	2	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)........................	4	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer).....	48	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus	24	..	..	..	..	..	..	..	..	3
131. Ovarian cysts and tumors......	36	..	..	..	..	..	..	1	..	..
132. Other diseases of female genital organs....................	97	..	..	..	..	..	..	..	..	9
133. Diseases of breast (not puerperal, nor cancer.............	1	1	..	..	..	..	1	..	..	..
VII.—Puerperal Diseases.										
134. Accident of pregnancy.........	99	..	..	..	..	..	..	..	..	3
135. Puerperal hæmorrhage..........	24	..	..	..	..	..	..	..	..	1
136. Other accidents of labor........	66	..	..	..	..	..	..	..	1	2
137. Puerperal septicæmia...........	151	..	..	..	..	..	..	..	..	9
138. Puerperal albuminuria and convulsions..................	80	..	..	..	..	..	..	..	..	5
139. Puerperal phlegmasia alba dolens	1	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death................	4	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast....	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
..	1	..	..	..	4	..	..	1	..	..	1	..	..	..
2	..	1	1	..	..	..	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	9	15	21	20	27	23	17	21	9	7	5	2	..	1
1	2	2	10	8	6	8	4	2	5	1	1	1	..	1
..	..	4	..	4	3	3	5	5	5	3	1	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	5	4	2	5	2	2	..	..	1	..	..	..	..	2
..	2	1	..	..	1	..	1	..	1	..	..	..	..	..
12	9	5	9	7	6	6	2	2	1	1	1	..	..	3
8	23	14	10	6	12	11	13	8	13	5	1	2	2	13
18	61	55	91	104	106	144	127	171	146	114	78	50	34	29
1	1	4	1	3	1	2	1	1	1	1	..	..	..	..
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..	..	1	1	..	..	..	..	..	..	..	..	..	..	..
..	1	..	2	..	..	..	..	..	..	..	..	1	..	..
..	2	5	3	17	8	5	4	3	1	..	..	..	..	2
2	3	2	6	4	1	1	1	..	1	..	..	..	..	..
5	6	6	6	3	3	2	1	2	1	..	..	..	..	..
20	25	22	10	10	1	..	..	..	..	..	..	..	..	9
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	24	27	22	9	1	..	..	..	..	..	..	..	..	2
5	5	8	3	2	..	..	..	..	..	..	..	..	..	1
11	10	20	18	4	..	..	..	..	..	..	..	..	..	..
36	49	31	19	6	1	..	..	..	..	..	..	..	..	6
21	22	14	11	7	..	..	..	..	..	..	..	..	..	4
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
1	2	..	..	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
VIII.—Diseases of Skin and Cellular Tissue.										
142. Gangrene	31	1	..	..	..	..	1	..	..	..
143. Carbuncle	4	1	1	..	..	..	2	..	..	..
144. Phlegmon, acute abscess	35	13	..	1	..	..	14	1	..	2
145. Other diseases of skin and adnexa	8	5	..	..	..	..	5	..	..	..
IX.—Diseases of Locomotory System.										
146. Diseases of bones (not tuberculous)	25	6	6	1	..	..	13	3	3	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	5	..	..	..	..	..	..	..	..	1
148. Amputation	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	1	..	..	..	..	..	..	..	..	..
X.—Malformations.										
150. Congenital malformations	119	105	5	4	..	..	114	4	..	..
XI.—Diseases of Infancy.										
151. Congenital debility, icterus and sclerema	943	942	1	..	..	..	943	..	..	..
151a. Injury during birth	88	88	..	..	..	..	88	..	..	..
152. Other diseases peculiar to infancy	5	5	..	..	..	..	5	..	..	..
153. Neglect	1	1	..	..	..	..	1	..	..	..
XII.—Diseases of Old Age.										
154. Senile debility	169	..	..	..	..	..	..	..	..	..
XIII.—External Causes.										
155. Suicide by poison	31	..	..	..	..	..	..	..	..	4
156. Suicide by asphyxia	24	..	..	..	..	..	..	..	..	3
157. Suicide by hanging or strangulation	6	..	..	..	..	..	..	..	..	..
158. Suicide by drowning	2	..	..	..	..	..	..	..	..	..
159. Suicide by firearms	10	..	..	..	..	..	..	..	..	..
160. Suicide by cutting instruments	4	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height	9	..	..	..	..	..	..	..	..	..
162. Suicide by crushing	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods	..	..	..	..	..	..	..	..	..	..
164. Fractures	13	1	..	..	..	..	1	..	..	..
165. Dislocations	1	..	..	..	..	..	..	..	..	..
166. Other accidental injuries	187	4	7	11	12	8	42	37	1	2
167. Burn by fire scald	115	1	4	13	7	10	35	21	4	1
168. Burning by corrosive substances	..	..	..	..	..	..	..	..	..	..
169. Sunstroke	48	13	1	1	1	..	16	..	..	1
170. Freezing	..	..	..	..	..	..	..	..	..	..
171. Electrical shock	1	..	..	..	..	..	..	..	..	1
172. Accidental drowning	13	..	1	..	..	..	1	..	1	2

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
..	..	..	..	..	2	2	3	4	6	4	4	4	1	..
..	..	..	..	1	..	..	..	..	..	..	1	..	..	..
..	..	2	3	..	2	1	1	4	1	..	2	1	1	..
..	..	..	..	2	..	..	..	..	1	..	..	..	..	..
..	1	..	..	1	..	..	..	..	2	2	..	..	..	..
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..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	40
..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	1	8	17	28	35	37	43	2
4	8	5	2	1	2	..	2	3	..	..	..	..	..	..
2	4	1	2	4	2	3	..	2	1	..	..	..	..	..
1	..	1	1	2	..	..	..	..	1	..	..	..	..	..
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3	3	3	..	..	1	..	..	..	..	..	..	..	..	..
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1	1	3	..	..	1	2	1	..	..	..	..	..	..	..
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1	..	..	..	3	..	2	..	4	1	..	..	1	..	..
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10	11	9	12	9	7	9	7	9	7	6	5	4	..	5
4	10	8	4	7	3	4	1	4	4	2	3	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	1	3	3	..	3	5	1	4	3	2	3	1	1
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..	3	3	2	1	..	..	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
173. Inanition (starvation)	1	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal	85	2	1	2	3	..	8	4	7	6
175. Other acute poisoning	27	1	..	..	..	..	1	1	1	1
176. Other external violence	58	11	..	1	..	..	12	3	1	2
(Of which) a. Homicide, by blows	2	..	..	..	..	..	..	..	1	..
b. Homicide, by sharp instruments	5	..	..	..	..	..	..	..	..	..
c. Homicide, by gunshot	9	..	..	..	..	..	..	1	..	..
d. Homicide, by poison	..	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods	4	..	1	..	..	..	1	1	..	..
XIV.—Ill-defined or not Specified Causes.										
177. Dropsy	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes	281	244	27	4	4	..	279	2	..	..
I.—General diseases	4,307	308	230	152	105	74	869	172	72	156
a. Tuberculous diseases	1,839	71	59	45	19	15	209	58	38	117
b. Cancer	957	2	..	1	..	1	4	3	1	3
II.—Diseases of nervous system and organs of sense	1,895	323	128	84	58	38	631	166	85	68
III.—Diseases of circulatory system	1,682	37	5	2	5	3	52	45	47	43
IV.—Diseases of respiratory system	3,195	866	469	139	66	40	1,580	64	28	38
V.—Diseases of digestive system	2,377	1,276	229	43	21	16	1,585	37	13	26
VI.—Diseases of genito-urinary system	1,750	25	5	7	4	1	42	9	11	40
VII.—Puerperal diseases	425	..	..	..	..	..	..	..	1	20
VIII.—Diseases of skin and cellular tissue	78	20	1	1	..	..	22	1	..	2
IX.—Diseases of locomotor system	31	6	6	1	..	..	13	3	3	1
X.—Malformation	119	105	5	4	..	..	114	4	..	..
XI.—Diseases of infancy	1,037	1,036	1	..	..	..	1,037	..	..	..
XII.—Diseases of old age	169	..	..	..	..	..	..	..	..	..
XIII.—External causes	635	33	14	28	23	18	116	66	15	23
a. Suicide	86	..	..	..	..	..	..	..	..	7
b. Homicide	20	..	1	..	..	..	1	2	1	..
c. Accident	529	33	13	28	23	18	115	64	14	16
XIV.—Causes ill-defined	281	244	27	4	4	..	279	2	..	..
Total males	..	..	..	..	..	..	..	..	..	..
" females	17,981	4,279	1,120	465	286	190	6,340	569	275	417
" both sexes	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
9	14	5	3	6	7	2	2	3	1	1	1	5	1	..	..
5	1	5	2	4	1	1	1	..	1	1	1	..	..	1	..
9	6	6	10	3	3	..	..	1	1	..	..	1	..	6	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	..	1	..	..	..	..	1	..	..	..	..	..	1	..
3	1	1	2	1	..	..	..	..	..	..	..	..	..	1	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	13	..
307	375	336	352	303	253	253	227	225	186	109	69	30	13	160	2
253	280	236	215	134	89	67	48	47	28	12	5	2	1	113	2
6	27	32	79	100	115	131	129	116	98	62	34	11	6	17	..
42	43	41	65	69	73	92	99	109	93	89	62	39	29	39	..
47	67	72	94	108	124	143	144	185	158	144	111	53	45	55	..
53	67	71	95	103	97	142	143	176	162	141	110	60	65	114	2
38	39	49	79	75	80	75	55	70	61	35	33	17	10	52	1
54	122	110	131	147	132	165	148	186	163	121	79	54	36	54	..
87	112	100	74	28	3	..	..	..	..	..	..	..	..	12	..
..	..	2	3	3	4	3	4	8	8	4	7	5	2	..	..
..	2	1	1	1	..	..	..	2	2	2	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	44	..
..	..	..	..	..	..	..	1	8	17	28	35	37	43	2	..
50	62	52	44	45	27	26	19	27	21	14	12	14	2	13	..
11	16	15	7	9	6	5	3	5	2	..	..	..	..	..	..
6	2	2	3	2	..	..	..	1	..	..	..	..	..	2	..
33	14	35	34	34	21	21	16	21	19	14	12	14	2	11	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
678	890	834	938	882	793	899	840	996	871	687	518	309	245	559	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Deaths of Males by Age, and Cause of Death,

Cause of Death.	Total both Sexes	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I —General Diseases.											
1. Typhoid fever.........	37	21	..	..	..	..	..	..	..	4	4
2. Typhus fever..........	..	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever.......	..	..	..	..	..	..	..	..	..	..	..
4. Malarial fever.........	5	2	1	..	1	..	..	2	..	..	..
5. Smallpox..............	..	..	..	..	..	..	..	..	..	..	..
6. Measles................	57	28	14	9	3	1	..	27	1	..	..
7. Scarlet fever...........	71	40	2	9	12	5	6	34	5	..	..
8. Whooping cough......	31	14	8	4	1	..	1	14	..	..	..
9. Diphtheria and croup..	200	91	10	22	20	11	8	71	13	5	2
10. Influenza..............	24	10	..	1	..	..	..	1	1	..	1
11. Miliary fever..........	..	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera........	..	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras........	..	..	..	..	..	..	..	..	..	..	..
14. Dysentery.............	12	8	3	1	..	..	..	4	1	..	..
15. Plague.................	..	..	..	..	..	..	..	..	..	..	..
16. Yellow fever...........	..	..	..	..	..	..	..	..	..	..	..
17. Leprosy................	..	..	..	..	..	..	..	..	..	..	..
18. Erysipelas.............	9	6	1	..	..	..	..	1	..	..	..
19. Other epidemic diseases	3	2	2	..	..	..	..	2	..	..	..
20. Pyæmia, septicæmia...	4	3	..	..	..	..	..	..	..	..	..
21. Glanders...............	..	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule.....	..	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia...........	..	..	..	..	..	..	..	..	..	..	..
24. Actinomycosis.........	..	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis............	..	..	..	..	..	..	..	..	..	..	..
25. Pellagra...............	..	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	5	4	..	..	..	..	..	..	..	..	..
27. Tuberculosis of lungs..	1,441	922	3	3	1	..	..	7	3	10	44
28. Tubercular meningitis.	42	16	4	5	1	..	..	10	3	1	..
29. Abdominal tuberculosis	6	2	..	1	..	..	..	1	..	..	..
30. Pott's disease..........	4	2	..	..	..	..	1	1	..	1	..
31. Cold abscess...........	1	1	..	..	..	..	..	..	1	..	..
32. White swelling........	1	..	..	..	..	..	..	..	..	..	..

THE BRONX.

for the Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
3	1	2	4	..	..	1	1	1	..	..	..	..	..	..	..
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..	..	1	1	1	1	..	..	..	..	..	..	..	..	..	..
98	123	151	180	104	74	51	35	25	11	5	1	..	..	58	1
..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
33. Tuberculosis of other organs	6	2	..	1	..	..	..	1	..	..	..
34. General tuberculosis	8	5	..	1	..	..	..	1	..	..	..
35. Scrofula	..	..	..	..	..	..	..	..	..	..	..
36. Syphilis	13	11	6	..	..	..	..	6	..	..	2
37. Gonorrhœa (adults)	..	..	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children)	..	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	9	5	..	..	..	..	..	..	..	..	..
40. Cancer of stomach, liver	82	44	..	..	..	..	..	..	..	1	..
41. Cancer of intestines, rectum	24	11	..	..	..	..	..	..	..	..	..
42. Cancer of female genital organs	31	..	..	..	..	..	..	..	..	..	..
43. Cancer of the breast	9	..	..	..	..	..	..	..	..	..	..
44. Cancer of the skin	5	2	..	..	..	..	..	..	..	..	..
45. Cancer of other organs and unspecified	25	14	..	..	..	..	..	..	..	..	..
46. Other tumors (except of female genital organs	3	2	..	..	..	..	..	..	..	..	..
47. Acute articular rheumatism	21	16	..	..	..	1	..	1	3	2	1
48. Chronic rheumatism and gout	17	8	..	..	..	..	..	..	..	..	..
49. Scurvy	..	..	..	..	..	..	..	..	..	..	..
50. Diabetes	30	12	..	..	..	..	..	..	..	..	..
51. Exophthalmic goitre	2	2	..	..	..	..	..	..	..	..	..
52. Addison's disease	1	1	..	..	..	..	..	..	..	..	..
53. Leukæmia	4	2	..	..	..	..	..	..	..	..	..
54. Anæmia, chlorosis	6	2	..	..	..	..	..	..	..	..	..
55. Other general diseases	..	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic	40	36	..	..	..	..	..	..	..	..	..
57. Lead poisoning	1	1	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	..	..	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings	..	..	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.											
60. Encephalitis	1	..	..	..	..	..	..	..	..	..	..
61. Simple meningitis	127	75	15	7	4	6	1	33	15	8	7
61a. (of which) cerebro-spinal meningitis	87	50	10	4	2	4	1	21	10	6	6
62. Locomotor ataxia	10	8	..	..	..	..	..	..	..	1	..
63. Other diseases of spinal cord	15	9	..	1	1	..	..	2	..	..	..
64. Apoplexy, congestion of brain	214	106	1	..	..	..	..	1	..	..	..
65. Softening of brain	8	3	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
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1	2	..	..	1	..	..	..	..	..	..	..	..	..	1	..
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..	..	1	1	4	7	4	3	9	8	1	4	1	..	..	..
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..	2	..	2	10	6	14	12	13	17	10	10	3	6	3	..
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
66. Paralysis unspecified..	22	13	..	..	..	..	..	..	..	..	..
67. General paresis.......	4	2	..	..	..	..	..	..	..	..	..
68. Other forms of insanity	3	..	..	..	..	..	..	..	..	..	..
69. Epilepsy..............	14	10	1	2	..	..	..	3	..	1	..
70. Convulsions (not puerperal).........	..	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants	33	18	11	2	..	..	1	14	4	..	..
72. Tetanus, trismus	4	4	1	..	..	..	..	1	..	1	..
73. Chorea	..	..	..	..	..	..	..	..	..	..	..
74. Other nervous diseases	6	4	..	1	..	1	..	2	1	..	..
75. Diseases of the eyes ..	..	..	..	..	..	..	..	..	..	..	..
76. Diseases of the ears...	1	..	..	..	..	..	..	..	..	..	..
III.—Diseases of Circulatory System.											
77. Pericarditis...........	2	1	..	..	..	..	..	..	..	..	..
78. Acute endocarditis....	20	9	1	..	..	..	..	1	..	1	..
79. Organic heart diseases	342	177	..	..	1	..	2	3	4	6	4
80. Angina pectoris.......	3	1	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc......	12	7	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis	16	10	..	..	..	..	..	..	..	..	..
83. Diseases of veins, hæmorrhoids, varices, phlebitis, etc ..	2	1	..	..	..	..	..	..	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	..	..	..	..	..	..	..	..	..	..	..
85. Hæmorrhage	2	2	..	..	..	..	..	..	..	..	1
86. Other diseases of circulatory system ...	..	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.											
87. Diseases of nasal fossae	..	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx	1	1	..	..	..	..	1	1	..	..	..
89. Diseases of thyroid gland..............	..	..	..	..	..	..	..	..	..	..	..
90. Acute bronchitis......	43	16	8	2	1	..	..	11	..	..	..
91. Chronic bronchitis....	30	8	..	..	..	..	..	..	..	..	..
92. Broncho-pneumonia ..	153	77	38	18	5	1	..	62	..	..	..
93. Pneumonia...........	364	223	30	11	4	3	3	51	8	5	3
94. Pleurisy	22	9	..	1	..	..	..	1	..	..	..
95. Congestion of the lungs, pulmonary apoplexy	16	9	2	1	..	..	..	3	..	..	..
96. Gangrene of lung.....	1	1	..	..	..	..	..	..	..	..	..
97. Asthma...............	10	5	..	..	..	..	..	..	..	..	..
98. Pulmonary emphysema	4	2	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	6	3	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
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Cause of Death	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
V.—Diseases of Digestive System.											
100. Diseases of mouth and adnexa........	2	2	..	..	..	..	..	..	1	..	..
101. Diseases of pharynx..	1	1	..	..	..	..	..	..	..	..	..
102. Diseases of œsophagus	..	..	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach.....	9	8	..	..	..	..	..	..	..	..	..
104. Other diseases of stomach (cancer excepted)..........	33	15	2	2	..	1	..	5	1	..	..
105. Diarrhœa and enteritis (under two years)............	298	172	152	20	..	..	..	172	..	..	..
(of which) chronic diarrhœa........	..	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over)..........	51	25	..	..	5	2	..	7	..	..	..
107. Intestinal parasites...	2	1	..	1	..	..	..	1	..	..	..
108. Hernia, intestinal obstruction........	31	11	4	..	..	1	..	5	1	1	..
109. Other diseases of intestines..........	5	2	..	..	..	..	..	..	..	..	..
110. Acute yellow atrophy of liver........	..	..	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver...............	1	1	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver.....	42	26	..	..	..	..	..	..	..	..	..
113. Biliary calculi.........	1	..	..	..	..	..	..	..	..	..	..
114. Other diseases of liver...............	5	1	..	..	..	..	..	..	..	..	..
115. Diseases of spleen....	1	1	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal)....	9	2	..	..	..	..	..	..	..	..	..
117. Other diseases of digestive system (except tuberculosis and cancer)........	..	..	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess.......	23	12	..	..	..	..	..	..	2	1	..
VI.—Diseases of Genito-urinary system.											
119. Acute nephritis........	47	23	3	..	1	..	1	5	3	..	1
120. Bright's disease.......	343	184	1	..	..	..	1	2	1	1	2
121. Other diseases of kidneys and adnexa	6	5	..	..	..	..	..	..	..	..	..
122. Urinary calculus......	1	1	..	..	..	..	..	..	..	..	..
123. Diseases of bladder...	9	7	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc.	1	1	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate................	3	3	..	..	.	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs..........	..	..	..	..	..	..	..	..	..	..	..
127. Metritis................	..	..	..	..	..	..	..	..	..	..	..
128. Uterine hemorrhage (not puerperal)....	..	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer)............	..	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
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2	3	..	..	1	2	..	..	1	..	..	..	..	..	..	..
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..	4	8	11	6	18	22	17	27	22	13	16	9	5	10	..
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
130. Other diseases of uterus	4	..	..	..	..	..	..	..	..	..	..
131. Ovarian. cysts and tumors	2	..	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs	6	..	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal, nor cancer)	..	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.											
134. Accidents of pregnancy	7	..	..	..	..	..	..	..	..	..	..
135. Puerperal hæmorrhage	5	..	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	2	..	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia	38	..	..	..	..	..	..	..	..	..	..
138. Puerperal albuminuria and convulsions.	6	..	..	..	..	..	..	..	..	..	..
139. Puerperal phlegmasia alba dolens	..	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	2	..	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast	..	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.											
142. Gangrene	6	1	..	..	..	..	..	..	..	..	..
143. Carbuncle	2	2	..	..	..	..	..	..	..	..	..
144. Phlegmon, acute abscess	3	1	..	..	..	..	..	..	..	..	..
145. Other diseases of skin and adnexa	1	1	1	..	..	..	..	1	..	..	..
IX.—Diseases of Locomotory System.											
146. Diseases of bones (non-tuberculous)	8	3	1	2	..	..	..	3	..	..	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	..	..	..	..	..	..	..	..	..	..	..
148. Amputation	..	..	.	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	..	..	..	..	..	..	..	..	..	..	..
X.—Malformations.											
150. Congenital malformations	34	15	14	1	..	..	..	15	..	..	..
XI.—Diseases of Infancy.											
151. Congenital debility, icterus and sclerema	211	121	121	..	..	..	..	121	..	..	..
151a. Injury during birth	6	3	3	..	..	..	..	3	..	..	..
152. Other diseases peculiar to infancy	8	6	6	..	..	..	..	6	..	..	..
153. Neglect	..	..	..	..	..	..	..	..	..	..	..
XII.—Diseases of Old Age.											
154. Senile debility	43	13	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
XIII.—External Causes.											
155. Suicide by poison	6	6	..	..	..	..	..	....	..	..	..
156. Suicide by asphyxia	10	7	..	..	..	..	..	....	..	..	..
157. Suicide by hanging or strangulation	9	8	..	..	..	..	..	....	..	..	..
158. Suicide by drowning	2	2	..	..	..	..	..	....	..	..	..
159. Suicide by firearms	10	9	..	..	..	..	..	....	..	..	1
160. Suicide by cutting instruments	4	4	..	..	..	..	..	....	..	..	..
161. Suicide by precipitation from height	1	1	..	..	..	..	..	....	..	..	..
162. Suicide by crushing	1	1	..	..	..	..	..	....	..	..	..
163. Suicide by other methods	..	..	..	..	..	..	..	....	..	..	..
164. Fractures	29	25	..	..	..	..	..	....	..	5	2
165. Dislocations	..	..	..	..	..	..	..	....	..	..	..
166. Other accidental injuries	145	131	2	..	1	1	2	6	9	6	12
167. Burn by fire, scald	25	8	1	1	2	2	1	7	1	..	..
168. Burning by corrosive substances	..	..	..	..	..	..	..	....	..	..	..
169. Sunstroke	17	14	2	..	..	..	..	2	1	..	2
170. Freezing	2	2	..	..	..	..	..	....	..	..	1
171. Electrical shock	1	1	..	..	..	..	..	....	..	1	..
172. Accidental drowning	43	41	..	..	..	1	..	1	3	3	2
173. Inanition (starvation)	..	..	..	..	..	..	..	....	..	..	..
174. Inhalation of noxious gas, not suicidal	19	17	..	1	..	..	..	1	1	..	..
175. Other acute poisoning	5	4	1	..	..	..	..	1	..	..	..
176. Other external violence	18	13	2	..	..	..	..	2	1	..	1
Of which											
a. Homicide, by blows	..	..	..	..	..	..	..	....	..	..	..
b. Homicide by sharp instruments	3	3	..	..	..	..	..	....	..	..	..
c. Homicide, by gunshot	7	6	..	..	..	..	..	....	1	..	1
d. Homicide, by poison	..	..	..	..	..	..	..	....	..	..	..
e. Homicide, by other methods	2	1	1	..	..	..	..	1	..	..	..
XIV.—Ill-defined or not Specified Causes.											
177. Dropsy	..	..	..	..	..	..	..	....	..	..	..
178. Sudden death, not puerperal	..	..	..	..	..	..	..	....	..	..	..
179. Ill-defined causes	62	28	25	2	..	..	..	27	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	..	3	..	..	..	..	2	1	..	..	..	..	..	..
..	..	..	2	1	2	1	1	..	..	..	..	..	..	..	..
..	1	1	..	1	2	1	1	1	..	..	..	..	..	..	..
..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..
..	1	3	2	..	1	..	..	1	..	..	..	..	..	..	..
1	..	..	..	..	1	..	..	1	1	..	..	..	..	..	..
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3	2	4	4	..	3	1	..	1	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	8	15	19	10	14	8	1	4	3	..	2	..	2	2	..
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1	1	2	1	..	..	1	..	..	..	1	..	..	..	..	..
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3	5	6	4	2	2	5	4	..	1	..	..	..	..	1	..
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2	..	4	1	3	1	1	..	2	1	..	..	..	..	..	..
..	..	..	..	..	..	1	..	..	..	2	..	..	..	..	..
1	3	4	1	..	..	..	..	..	..	..	..	..	..	..	..
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1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	2	1	..	..	..	..	..	..	..	..	..	..	..	..
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I. General diseases....	2,290	1,348	54	57	39	18	16	184	31	24	54
a. Tuberculous diseases..........	1,514	954	7	11	2	..	1	21	7	12	44
b. Cancer...........	185	76	..	..	..	..	..	..	..	1	..
II.—Diseases of nervous system and organs of sense..	462	252	29	13	5	7	2	56	20	11	7
III.—Diseases of circulatory system..	399	208	1	..	1	..	2	4	4	7	5
IV.—Diseases of respiratory system .	650	354	78	33	10	4	4	129	8	5	3
V.—Diseases of digestive system.......	514	280	158	23	5	4	..	190	5	1	..
VI.—Diseases of genito-urinary system	422	224	4	..	1	..	2	7	4	1	3
VII.—Puerperal diseases.	60	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of skin and cellular tissue............	12	5	1	..	..	..	..	1	..	..	..
IX.—Diseases of locomotory system.	8	3	1	2	..	..	..	3	..	..	..
X.—Malformations.....	34	15	14	1	..	..	..	15	..	..	..
XI.—Diseases of infancy.	225	130	130	..	..	..	..	130	..	..	..
XII.—Diseases of old age.	43	13	..	..	..	..	..	..	..	..	..
XIII.—External causes....	347	294	8	2	3	4	3	20	16	15	21
a. Suicide...........	43	38	..	..	..	..	..	..	..	..	1
b. Homicide........	12	10	1	..	..	..	..	1	1	..	1
c. Accident..........	292	246	7	2	3	4	3	19	15	15	19
XIV.—Causes ill-defined..	62	28	25	2	..	..	..	27	..	..	..
Total males.....	....	3,154	503	133	64	37	29	766	88	64	93
Total females...	....	2,374	414	127	57	41	20	659	78	53	73
Total both sexes.	....	5,528	917	260	121	78	49	1,425	166	117	166

Deaths of Females by Age and Cause of Death

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.										
1. Typhoid fever..................	16	..	..	..	..	..	..	..	2	2
2. Typhus fever....................	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever.................	..	..	..	..	..	..	..	..	..	..
4. Malarial fever..................	3	..	..	..	..	..	..	..	..	1
5. Smallpox........................	..	..	..	..	..	..	.	..	..	..
6. Measles.........................	29	10	11	3	1	..	25	2	1	..
7. Scarlet fever....................	31	1	5	7	3	2	18	8	4	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
106	133	171	199	124	103	66	48	44	29	15	14	2	1	62	1
100	125	153	182	107	75	51	35	25	11	5	1	..	..	60	1
..	..	2	1	6	11	5	8	14	14	5	8	1	..	..	..
6	3	2	5	16	11	16	14	25	22	18	10	4	6	5	..
5	11	3	12	11	22	18	12	18	28	22	17	3	6	5	..
5	10	16	22	22	29	22	16	18	11	13	10	14	1	7	1
3	7	6	6	9	8	7	5	14	7	5	5	1	1	2	..
..	4	9	14	7	20	29	24	28	22	15	23	9	5	10	..
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..	..	..	..	..	..	..	..	..	..	2	1	7	3	..	..
23	22	40	37	18	28	20	8	12	7	3	2	..	2	3	..
1	3	5	7	3	6	2	3	5	2	..	..	..	..	..	..
1	1	4	1	..	..	..	..	..	..	..	..	..	..	..	..
21	18	31	29	15	22	18	5	7	5	3	2	..	2	3	..
..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..
148	190	247	295	208	222	178	127	161	127	93	82	40	25	99	2
138	144	131	165	116	112	101	102	118	100	102	79	64	39	114	..
286	334	378	460	324	334	279	229	279	227	195	161	104	64	213	2

for the Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
2	3	3	2	1	..	1	..	..	..	..	..	..	..	..
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
8. Whooping cough..................	17	14	2	..	..	1	17	..	..	..
9. Diphtheria and croup...........	109	11	30	21	16	9	87	17	4	1
10. Influenza	14	..	..	..	..	..	..	..	..	..
11. Miliary fever	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera..................	..	..	..	..	..	..	..	..	..	..
13 Cholera nostras.................	..	..	..	..	..	..	..	..	..	..
14. Dysentery	4	2	2	..	..	..	4	..	..	..
15. Plague..........................	..	..	..	..	..	..	..	..	..	..
16. Yellow fever....................	..	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..
18. Erysipelas......................	3	2	..	..	..	..	2	..	..	..
19. Other epidemic diseases........	1	1	..	..	..	..	1	..	..	..
20. Pyæmia, septicæmia............	1	..	..	..	..	..	..	..	..	..
21. Glanders........................	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule..............	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia	..	..	..	..	..	..	..	..	..	..
24. Actinomycosis	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis....................	..	..	..	..	..	..	..	..	..	..
25. Pellagra........................	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx..........	1	..	..	..	..	..	..	..	..	..
27. Tuberculosis of lungs...........	519	..	2	4	1	1	8	4	19	38
28. Tubercular meningitis..........	26	5	11	2	3	..	21	3	..	..
29. Abdominal tuberculosis.........	4	..	..	..	..	..	..	1	..	1
30. Pott's disease..................	2	..	..	..	..	..	..	..	..	1
31. Cold abscess....................	..	..	..	..	..	..	..	..	..	..
32. White swelling	1	..	..	..	..	..	..	..	..	..
33. Tuberculosis of other organs ...	4	..	1	..	..	..	1	..	..	..
34. General tuberculosis............	3	..	..	1	..	..	1	..	..	..
35. Scrofula	..	..	..	..	..	..	..	..	..	..
36. Syphilis	2	2	..	..	..	..	2	..	..	..
37. Gonorrhœa (adults)	..	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children)..........	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	4	..	..	..	..	..	..	..	..	..
40. Cancer of stomach, liver........	38	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum....	13	..	..	..	..	..	..	..	1	..
42. Cancer of female genital organs	31	..	..	..	..	..	..	..	..	..
43. Cancer of the breast............	9	..	..	..	..	..	..	..	..	..
44. Cancer of the skin..............	3	..	..	1	..	..	1	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	1	..	..	..	..	1	..	2	4	2	2	2	..	..
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..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
88	89	74	85	43	25	16	14	10	2	3	..	..	1	42
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1	..	..	..	1	..	..	..	..	..	3
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	1	..	..	..	1
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..	..	..	1	3	1	4	6	10	3	6	2	1	1	2
..	..	..	..	3	4	2	1	1	1	..	..	..	..	2
..	3	3	2	7	5	3	1	1	3	2	..	..	1	2
..	..	..	..	1	1	2	..	4	..	1	..	..	..	..
..	..	..	..	..	..	2	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
45. Cancer of other organs and unspecified	11	..	..	..	..	..	..	..	..	1
46. Other tumors (except of female genital organs)	1	..	..	..	..	..	..	..	..	1
47. Acute articular rheumatism	5	..	..	..	..	..	..	..	..	..
48. Chronic rheumatism and gout	9	..	..	..	..	..	..	..	..	..
49. Scurvy	..	..	..	..	..	..	..	..	..	..
50. Diabetes	18	..	..	..	..	..	..	1	..	..
51. Exophthalmic goitre	..	..	..	..	..	..	..	..	..	..
52. Addison's disease	..	..	..	..	..	..	..	..	..	..
53. Leukæmia	2	..	..	..	..	..	..	..	..	1
54. Anæmia, chlorosis	4	..	..	..	1	..	1	..	..	..
55. Other general diseases	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic	4	..	..	..	..	..	..	..	..	..
57. Lead poisoning	..	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	..	..	..	..	..	..	..	..	..	..
59. Other chronic poisoning	..	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.										
60. Encephalitis	1	..	..	..	..	..	..	..	..	..
61. Simple meningitis	52	14	5	3	3	1	26	11	6	2
61a. (Of which) Cerebro-spinal meningitis	37	5	4	2	3	1	15	10	4	2
62. Locomotor ataxia	2	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord	6	..	..	..	..	..	..	..	..	..
64. Apoplexy, congestion of brain	108	1	1	..	..	..	2	..	..	..
65. Softening of brain	5	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified	9	..	..	..	..	..	..	..	..	..
67. General paresis	2	..	..	..	..	..	..	..	..	..
68. Other forms of insanity	3	..	..	..	..	..	..	..	..	..
69. Epilepsy	4	1	..	..	..	..	1	..	..	..
70. Convulsions (not puerperal)	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants	15	13	1	1	..	..	15	..	..	..
72. Tetanus, trismus	..	..	..	..	..	..	..	..	..	..
73. Chorea	..	..	..	..	..	..	..	..	..	..
74. Other nervous diseases	2	..	..	..	..	..	..	..	..	..
75. Diseases of the eyes	..	..	..	..	..	..	..	..	..	..
76. Diseases of the ears	1	..	1	..	..	..	1	..	..	..
III.—Diseases of Circulatory System.										
77. Pericarditis	1	..	..	..	..	..	..	..	..	..
78. Acute endocarditis	11	..	..	..	..	..	..	2	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
..	..	1	2	2	..	1	2	..	1	..	..	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	2	1	..	..	1	1	..	..	..	..	..	..	..	..
..	..	1	..	..	..	..	..	..	1	1	3	..	..	..
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
79. Organic heart diseases.........	165	..	..	..	..	..	..	1	5	3
80. Angina pectoris................	2	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc........................	5	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis..........	6	..	..	..	..	..	..	..	..	..
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	1	..	..	..	..	..	..	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)..............	..	..	..	..	..	..	..	..	..	..
85. Hæmorrhage...................	..	..	..	..	..	..	..	..	..	..
86. Other diseases of circulatory system	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.										
87. Diseases of nasal fossae........	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx..........	..	..	..	..	..	..	..	..	..	..
89. Diseases of thyroid glands......	..	..	..	..	..	..	..	..	..	..
90. Acute bronchitis................	27	11	1	..	1	..	13	..	1	..
91. Chronic bronchitis..............	22	2	..	1	..	..	3	..	..	1
92. Broncho-pneumonia............	76	37	18	..	..	..	55	4	..	2
93. Pneumonia.....................	141	19	10	2	4	1	36	6	2	7
94. Pleurisy	13	..	..	..	..	..	..	1	1	..
95. Congestion of lungs, pulmonary apoplexy...............	7	..	..	1	..	..	1	..	..	..
96. Gangrene of lung..............	..	..	..	..	..	..	..	..	..	..
97. Asthma.........................	5	..	..	..	..	..	..	..	..	..
98. Pulmonary emphysema.........	2	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisis excepted) ..	3	..	..	..	..	..	..	..	..	1
V.—Diseases of Digestive System..										
100. Diseases of mouth and adnexa..	..	..	..	..	..	..	..	..	..	..
101. Diseases of pharynx............	..	..	..	..	..	..	..	..	..	..
102. Diseases of œsophagus.........	..	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach................	1	..	..	..	..	..	..	..	..	..
104. Other diseases of stomach (cancer excepted)...........	18	8	1	1	2	..	12	..	..	..
105. Diarrhœa and enteritis (under two years)..................	126	109	17	..	..	..	126	..	..	..
(Of which) Chronic diarrhœa...	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over).............	26	..	..	3	2	1	6	1	..	..
107. Intestinal parasites............	1	..	..	1	..	..	1	..	..	..
108. Hernia, intestinal obstruction..	20	2	..	1	..	..	3	..	..	1
109. Other diseases of intestines....	3	1	..	..	..	..	1	..	..	..
110. Acute yellow atrophy of liver...	..	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver.........	..	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver...............	16	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
5	6	6	11	6	16	6	15	14	20	23	11	11	6	5
..	..	..	..	..	..	1	..	..	..	..	1	..	..	..
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1	..	..	1	1	..	..	..	6	1	1	4	2	1	..
1	..	..	..	..	2	4	1	..	1	1	1	3	1	3
3	2	5	5	4	8	10	11	12	6	8	7	7	2	7
2	2	1	2	..	..	1	1	..	1	1	..	..	..	1
..	1	..	..	..	..	..	..	..	1	1	2	..	1	..
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..	..	..	2	1	1	1	5	..	3	..	3	..	..	1
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..	..	1	1	1	6	3	4	..	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
113. Biliary calculi	1	..	..	..	..	..	..	..	..	..
114. Other diseases of liver	4	..	..	..	..	..	..	..	..	..
115. Diseases of spleen	..	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal)	7	..	..	..	..	..	..	1	1	1
117. Other diseases of digestive system (except tuberculosis and cancer)	..	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess	11	..	..	1	1	..	2	1	1	1
VI.—Diseases of Genito-urinary System.										
119. Acute nephritis	24	3	..	..	..	..	3	1	1	..
120. Bright's disease	159	..	..	..	..	..	..	2	1	2
121. Other diseases of kidneys and adnexa	1	..	..	..	..	..	..	1	..	..
122. Urinary calculus	..	..	..	..	..	..	..	..	..	..
123. Diseases of bladder	2	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc	..	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs	..	..	..	..	..	..	..	..	..	..
127. Metritis	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer)	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus	4	..	..	..	..	..	..	..	..	..
131. Ovarian cysts and tumors	2	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs	6	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal, nor cancer)	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.										
134. Accidents of pregnancy	7	..	..	..	..	..	..	..	..	1
135. Puerperal hæmorrhage	5	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	2	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia	38	..	..	..	..	..	..	..	..	1
138. Puerperal albuminuria and convulsions	6	..	..	..	..	..	..	..	1	..
139. Puerperal phlegmasia alba dolens	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	2	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.										
142. Gangrene	5	..	..	..	..	..	..	1	..	..
143. Carbuncle	..	..	..	..	..	..	..	..	..	..
144. Phlegmon, acute abscess	2	..	1	..	..	..	1	..	..	..
145. Other diseases of skin and adnexa	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
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..	..	..	..	1	..	..	1	2	..	..	..	..	..	..
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2	..	1	1	..	..	..	..	..	..	..	..	..	..	2
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3	1	..	..	..	1	..	1	..	..	..	..	..	..	..
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4	7	9	9	14	11	16	18	22	16	11	7	6	4	19
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1	1	2	..	1	1	..	..	..	..	..	..	..	..	1
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1	1	2	1	1	..	..	..	..	..	..	..	..	..	2
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12	10	6	8	1	..	..	..	..	..	..	..	..	..	1
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
IX.—Diseases of Locomotory System.										
146. Diseases of bones (non-tuberculous)	5	2	1	..	..	1	4	..	..	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	..	..	..	..	..	..	..	..	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	..	..	..	..	..	..	..	..	..	..
X.—Malformations.										
150. Congenital malformations	19	16	2	..	..	..	18	1	..	..
XI.—Diseases of Infancy.										
151. Congenital debility, icterus and sclerema	90	90	..	..	..	..	90	..	..	..
151a. Injury during birth	3	3	..	..	..	..	3	..	..	..
152. Other diseases peculiar to infancy	2	2	..	..	..	..	2	..	..	..
153. Neglect	..	..	..	..	..	..	..	..	..	..
XII.—Diseases of Old Age.										
154. Senile debility	30	..	..	..	..	..	..	..	..	..
XIII.—External Causes.										
155. Suicide by poison	..	..	..	..	..	..	..	..	..	..
156. Suicide by asphyxia	3	..	..	..	..	..	..	..	..	..
157. Suicide by hanging or strangulation	1	..	..	..	..	..	..	..	..	..
158. Suicide by drowning	..	..	..	..	..	..	..	..	..	..
159. Suicide by firearms	1	..	..	..	..	..	..	..	..	..
160. Suicide by cutting instruments	..	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height	..	..	..	..	..	..	..	..	..	..
162. Suicide by crushing	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods	..	..	..	..	..	..	..	..	..	..
164. Fractures	4	..	..	1	..	..	1	..	..	..
165. Dislocations	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries	14	..	..	..	2	1	3	1	..	..
167. Burns, by fire, scald	17	..	1	1	..	2	4	6	..	1
168. Burning by corrosive substances	..	..	..	..	..	..	..	..	..	..
169. Sunstroke	3	..	..	..	..	..	..	1	..	1
170. Freezing	..	..	..	..	..	..	..	..	..	..
171. Electrical shock	..	..	..	..	..	..	..	..	..	..
172. Accidental drowning	2	..	..	..	..	..	..	..	2	..
173. Inanition (starvation)	..	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal	2	..	..	..	1	..	1	..	..	..
175. Other acute poisoning	1	..	..	1	..	..	1	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
176. Other external violence.........	5	1	..	..	..	..	1	..	..	1
(Of which) a. Homicide, by blows..	..	..	..	..	..	..	..	..	..	..
b. Homicide, by sharp instruments.......	..	..	..	..	..	..	..	..	..	..
c. Homicide, by gunshot	1	..	..	..	..	..	..	..	..	..
d. Homicide, by poison.	..	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods	1	..	..	..	..	..	..	..	..	..
XIV.—Ill-defined or Not Specified Causes.										
177. Dropsy	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal....	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes	34	31	3	..	..	..	34	..	..	..
I. General diseases	942	48	64	39	25	13	189	36	31	47
a. Tuberculosis diseases.....	560	5	14	7	4	1	31	8	19	40
b. Cancer	109	..	..	1	..	..	1	..	1	1
II. Diseases of nervous system and organs of sense........	210	29	8	4	3	1	45	11	6	2
III. Diseases of circulatory system	191	..	..	..	..	..	..	3	5	3
IV. Diseases of respiratory system	296	69	29	4	5	1	108	11	4	11
V. Diseases of digestive system..	234	120	18	7	5	1	151	3	2	3
VI. Diseases of genito-urinary system	198	3	..	..	..	..	3	4	2	2
VII. Puerperal diseases............	60	..	..	..	..	..	..	..	1	2
VIII. Diseases of skin and cellular tissue.....................	7	..	1	..	..	..	1	1	..	..
IX. Diseases of locomotory system	5	2	1	..	..	1	4	..	..	..
X. Malformations...............	19	16	2	..	..	..	18	1	..	..
XI. Diseases of infancy..........	95	95	..	..	..	..	95	..	..	..
XII. Diseases of old age	30	..	..	..	..	..	..	..	..	..
XIII. External causes...............	53	1	1	3	3	3	11	8	2	3
a. Suicide	5	..	..	..	..	..	..	..	..	..
b. Homicide................	2	..	..	..	..	..	..	..	..	..
c. Accident..................	46	1	1	3	3	3	11	8	2	3
XIV. Causes ill-defined............	34	31	3	..	..	..	34	..	..	..
Total......................	2,374	414	127	57	41	20	659	78	53	73

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
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96	103	85	97	65	39	37	26	33	19	17	10	6	6	57
90	94	74	86	45	25	16	14	11	2	4	..	..	1	46
..	3	4	5	16	11	15	10	17	8	10	3	2	2	7
3	..	4	9	9	12	10	12	15	15	24	19	9	5	1
6	8	6	12	9	20	9	17	14	21	25	13	12	8	5
7	5	6	8	5	11	19	14	20	14	17	16	14	6	11
5	2	3	9	3	10	7	13	4	7	..	8	4	..	5
6	10	12	13	18	16	19	18	26	17	13	7	8	4	20
13	13	13	15	3	..	..	..	..	..	..	..	..	..	3
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2	2	2	2	4	3	..	2	4	3	1	..	1	3	..
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138	144	131	165	116	112	101	102	118	100	102	79	64	39	114

Deaths of Males by Age, and Cause of Death,

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
1.—General Diseases.											
1. Typhoid fever.........	297	176	..	2	2	2	1	7	7	4	20
2. Typhus fever..........	..	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever........	..	..	..	..	..	..	..	..	..	..	..
4. Malarial fever.........	29	17	..	..	2	..	..	2	1	..	1
5. Smallpox..............	8	3	..	..	..	1	..	1	..	..	..
6. Measles................	193	99	33	35	13	7	1	89	9	..	..
7. Scarlet fever...........	182	88	9	13	15	14	10	61	20	3	1
8. Whooping cough......	138	73	39	20	5	8	1	73	..	..	..
9. Diphtheria and croup..	594	308	23	72	55	49	29	228	66	6	2
10. Influenza..............	146	69	8	6	1	2	1	18	..	2	3
11. Miliary fever..........	..	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera........	..	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras........	..	..	..	..	..	..	..	..	..	..	..
14. Dysentery...............	80	34	8	7	2	1	..	18	..	1	..
15. Plague...................	..	..	..	..	..	..	..	..	..	..	..
16. Yellow fever...........	..	..	..	..	..	..	..	..	..	..	..
17. Leprosy...............	..	..	..	..	..	..	..	..	..	..	..
18. Erysipelas.............	69	37	15	1	..	..	..	16	..	1	..
19. Other epidemic diseases	5	3	1	..	..	..	..	1	1	..	..
20. Pyæmia, septicæmia...	13	9	2	1	..	..	..	3	..	..	..
21. Glanders...............	..	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule.....	1	1	..	..	..	..	..	..	..	..	..
23. Hydrophobia..........	2	1	..	..	..	..	..	..	..	..	..
24. Actinomycosis.........	..	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis...........	..	..	..	..	..	..	..	..	..	..	..
25. Pellagra...............	..	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx.	44	33	1	..	..	..	..	1	..	..	2
27. Tuberculosis of lungs..	2,420	1,460	11	6	3	3	2	25	4	5	74
28. Tubercular meningitis.	173	92	19	20	16	8	7	70	10	3	3
29. Abdominal tuberculosis	85	50	11	3	1	2	..	17	1	2	1
30. Pott's disease..........	22	12	2	1	..	..	..	3	2	2	2
31. Cold abscess...........	1	1	..	..	..	..	..	..	..	..	..
32. White swelling........	11	9	1	..	..	..	..	1	1	..	2
33. Tuberculosis of other organs............	23	8	..	..	..	..	..	..	2	1	1

BROOKLYN.

for Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
34	26	13	31	12	7	3	5	6	..	1	..	..	..	5	..
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..	2	2	1	..	..	..	..	..	..	..	1	..	..	3	..
2	2	1	2	3	6	5	6	2	5	4	6	2	..	3	..
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1	3	4	5	4	5	5	1	2	..	..	..	..	..	..	..
165	181	244	203	188	139	87	66	34	39	5	..	1	..	47	2
..	2	..	1	1	1	..	..	1	..	..	..	..	..	3	..
4	6	5	3	2	1	4	1	..	2	1	..	..	..	..	..
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1	1	..	1	..	..	2	..	..	..	..	..	..	..	..	..
..	..	..	1	..	..	1	1	1	..	..	..	..	..	..	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
34. General tuberculosis...	30	15	1	1	..	1	..	3	4	1	1
35. Scrofula	3	..	..	..	..	..	..	..	..	..	..
36. Syphilis	51	26	14	..	..	..	..	14	1	..	1
37. Gonorrhœa (adults)...	4	1	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children).	1	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	28	23	..	..	..	..	..	..	1	..	..
40. Cancer of stomach, liver..............	375	175	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum	95	40	..	..	..	..	..	..	..	..	1
42. Cancer of female genital organs.....	169	..	..	..	..	..	..	..	..	..	..
43. Cancer of the breast...	108	..	..	..	..	..	..	..	..	..	..
44. Cancer of the skin.....	16	14	..	..	..	..	..	..	..	..	1
45. Cancer of other organs and unspecified................	108	61	2	..	..	..	..	2	..	..	..
46. Other tumors (except of female genital organs)..........	12	4	..	..	..	1	..	1	..	..	..
47. Acute articular rheumatism............	159	81	1	1	..	..	..	2	11	12	8
48. Chronic rheumatism and gout..........	42	19	..	..	..	..	..	..	..	..	2
49. Scurvy.................	2	1	1	..	..	..	..	1	..	..	..
50. Diabetes..............	202	92	..	..	..	..	..	..	..	..	1
51. Exophthalmic goitre ..	4	1	..	..	..	..	..	..	..	..	..
52. Addison's disease......	5	2	..	1	..	..	..	1	..	..	..
53. Leukæmia.............	11	3	..	..	..	..	..	..	1	..	..
54. Anæmia, chlorosis.....	35	9	1	1	..	..	..	2	..	..	..
55. Other general diseases.	..	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic........	135	117	..	..	..	..	..	..	1	..	1
57. Lead poisoning........	3	3	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation.	1	..	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings................	1	..	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.											
60. Encephalitis...........	10	7	1	1	2	..	..	4	1	..	..
61. Simple meningitis.....	636	334	45	38	29	22	26	160	64	26	28
61a. (of which) cerebro-spinal meningitis..	455	238	18	26	22	15	20	101	51	22	25
62. Locomotor ataxia.....	22	14	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord........	57	37	1	..	3	..	1	5	1	..	..
64. Apoplexy, congestion of brain............	1,104	505	6	..	1	..	..	7	1	..	3
65. Softening of brain.....	21	8	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified ..	63	30	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
..	1	..	2	..	1	..	1	1	..	..	..	..	..	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	4	2	..	1	2	1	..	..	..	..	..	..	..	1	..
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..	..	1	..	2	3	3	4	4	3	..	..	2	..	..	..
2	1	5	3	16	13	23	33	23	27	13	10	2	4	..	..
1	2	3	6	2	3	3	3	9	3	2	2	..	..	..	..
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..	..	..	..	1	..	2	2	1	2	2	2	1	..	..	..
3	3	3	1	3	4	8	4	14	5	5	5	1	..	1	..
..	..	..	..	..	..	1	..	..	..	1	1	..	..	..	..
5	2	7	3	5	10	4	2	3	5	2	..	..	..	..	1
..	..	..	1	..	2	2	4	1	2	3	2	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	3	4	4	6	4	13	12	10	15	11	3	4	..	..	..
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
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2	1	..	..	3	..	..	..	1	..	..	..	..	..	1	..
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2	9	20	29	24	12	10	4	3	2	..	..	..	..	..	..
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16	9	9	7	6	2	..	2	3	2	..	..	..	..	10	..
15	8	5	4	3	2	..	..	1	1	..	..	..	..	9	..
..	1	1	..	4	..	..	1	1	2	2	..	2	..	..	..
..	3	1	3	2	2	5	4	5	3	1	2	..	..	2	..
..	7	9	15	24	43	42	61	70	74	65	49	24	11	5	..
..	..	..	..	..	..	3	..	1	3	1	..	..	..	..	..
..	1	1	3	..	2	3	1	2	3	4	4	3	3	5	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
67. General paresis........	56	34	..	..	..	..	..	..	..	..	..
68. Other forms of insanity..............	29	15	..	1	..	..	..	1	..	..	..
69. Epilepsy...............	38	22	2	1	..	..	..	3	..	..	1
70. Convulsions (not puerperal)............	2	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants.	261	144	104	30	5	1	..	141	3	..	..
72. Tetanus, trismus	28	18	7	..	..	1	..	8	1	2	1
73. Chorea	2	1	..	..	..	..	..	..	1	..	..
74. Other nervous diseases.	57	31	5	1	1	..	..	7	2	2	2
75. Diseases of the eyes...	2	1	..	..	..	..	..	..	1	..	..
76. Diseases of the ears....	25	19	7	..	2	..	1	10	..	..	2
III.—Diseases of Circulatory System.											
77. Pericarditis	18	11	1	..	..	..	..	1	1	1	..
78. Acute endocarditis.....	264	126	2	..	..	1	2	5	1	..	4
79. Organic heart diseases.	1,662	816	8	..	1	1	..	10	14	11	19
80. Angina pectoris........	82	47	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc......	78	47	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis.	56	24	..	..	..	..	..	..	..	..	..
83. Diseases of veins, (hæmorrhoids, varices, phlebitis, etc.)	12	5	..	..	..	1	..	1	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)...............	3	1	..	..	..	..	..	..	1	..	..
85. Hæmorrhage...........	17	11	5	1	..	1	..	7	1	..	..
86. Other diseases of circulatory system....	..	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.											
87. Diseases of nasal fossae	..	..	..	..	..	..	..	..	..	..	..
88. Diseases of larynx.....	27	16	2	3	2	..	..	7	5	..	..
89. Diseases of thyroid gland.............	1	..	..	..	..	..	..	..	..	..	..
90. Acute bronchitis.......	468	240	153	37	11	3	4	208	2	..	1
91. Chronic bronchitis.....	189	80	3	1	1	..	1	6	1	..	1
92. Broncho-pneumonia....	951	494	224	102	33	18	6	383	9	2	2
93. Pneumonia	2,148	1,166	162	99	48	14	11	334	28	13	24
94. Pleurisy...............	89	57	..	1	2	1	..	4	3	..	2
95. Congestion of lungs, pulmonary apoplexy..............	26	14	2	1	..	..	..	3	..	..	..
96. Gangrene of lung......	4	4	..	..	..	..	..	..	..	1	..
97. Asthma................	87	45	..	1	..	..	..	1	..	..	..
98. Pulmonary emphysema	15	10	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	50	32	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	3	3	6	5	3	1	3	2	3	2	..	3	1	..
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3	5	11	9	12	7	12	15	10	12	7	9	3	1	2	1
20	36	37	56	56	64	62	84	98	79	72	52	27	19	21	..
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3	1	..	1	..	3	2	4	4	1	1	3	3	3	7	..
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4	4	4	10	9	10	8	7	6	13	5	8	6	4	19	..
35	60	73	93	82	79	75	65	65	58	43	24	10	5	27	1
8	9	3	5	4	6	4	3	2	1	1	1	..	1	..	..
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2	5	3	8	3	3	4	1	2	1	..	..	..	..	3	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
V.—Diseases of Digestive System.											
100. Diseases of mouth and adnexa.......	3	3	2	..	1	..	..	3	..	..	..
101. Diseases of pharynx..	12	6	1	..	..	..	1	2	2	1	..
102. Diseases of œsophagus...............	4	4	..	1	..	..	..	1	..	..	..
103. Ulcer of stomach.....	57	34	..	..	..	..	..	..	..	..	..
104. Other diseases of stomach (cancer excepted).........	178	96	24	8	2	4	..	38	2	2	..
105. Diarrhœa and enteritis (under 2 years)	1,985	1,068	891	177	..	..	..	1,068	..	..	..
(of which) chronic diarrhœa	..	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (2 years and over)..............	289	142	..	..	32	12	6	50	17	3	4
107. Intestinal parasites...	..	..	..	..	..	..	..	..	..	..	..
108. Hernia, intestinal obstruction........	188	86	11	2	1	1	..	15	..	1	1
109. Other diseases of intestines...........	13	9	2	..	..	..	1	3	..	..	..
110. Acute yellow atrophy of liver.......	2	..	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver..............	2	2	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver......	321	188	1	..	..	..	..	1	1	..	..
113. Biliary calculi........	14	1	..	..	..	..	..	..	..	..	..
114. Other diseases of liver	56	28	1	..	..	..	..	1	1	1	2
115. Diseases of spleen....	2	..	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal)...	12	8	..	..	..	..	..	..	2	..	1
117. Other diseases of digestive system (except tuberculosis and cancer).......	3	2	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess.........	165	91	..	1	..	2	..	3	8	20	9
VI.—Diseases of Genito-urinary System.											
119. Acute nephritis.......	224	123	9	4	3	3	2	21	8	..	5
120. Bright's disease.......	1,760	922	2	1	3	1	..	7	8	8	2
121. Otherdiseases of kidneys and adnexa..	19	8	..	..	..	..	..	..	1	..	1
122. Urinary calculus......	4	2	..	..	..	..	..	..	..	..	..
123. Diseases of bladder...	30	26	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc.	8	6	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate...............	39	39	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs........	1	1	1	..	..	..	..	1	..	..	..
127. Metritis..............	..	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)...	..	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
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1	2	5	4	3	5	3	2	1	5	..	1	1	1	1	..
1	3	6	4	5	3	2	6	7	6	4	3	3	1	..	..
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5	5	7	3	7	5	3	7	4	2	7	9	..	4	10	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	5	5	7	7	4	8	6	5	12	2	2	1	1	..	1
1	..	..	1	2	..	..	1	..	1	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
1	..	9	9	18	27	27	30	23	19	15	4	3	1	2	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
1	4	..	3	2	2	3	4	3	1	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	1	2	..	..	1	..	..	..	..	..	..	..
..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..
11	13	8	7	1	3	3	1	3	1	..	..	..	..	1	..
12	9	11	3	10	7	6	9	5	6	6	..	4	1	2	..
19	42	53	54	61	94	93	86	109	115	65	54	40	12	14	..
1	1	2	..	..	..	1	..	..	1	..	..	..	..	..	..
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..	..	..	..	1	..	..	3	3	5	2	3	7	2	..	..
..	..	1	1	1	..	1	..	1	1	..	..	..	..	..	..
..	..	..	..	..	1	1	2	8	4	10	7	3	3	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
129. Uterine tumor (not cancer)	25	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus	6	..	..	..	..	..	..	..	..	..	..
131. Ovarian cysts and tumors	31	..	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs	37	..	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal, nor cancer)	..	..	..	..	..	..	..	..	..	..	..
V —Puerperal Diseases.											
134. Accidents of pregnancy	49	..	..	..	..	..	..	..	..	..	..
135. Puerperal hæmorrhage	17	..	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	42	..	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia.	100	..	..	..	..	..	..	..	..	..	..
138. Puerperal albuminuria and convulsions	56	..	..	..	..	..	..	..	..	..	..
139. Puerperal phlegmasia alba dolens	1	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	9	..	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast	1	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.											
142. Gangrene	56	31	..	1	3	..	..	4	2	..	..
143. Carbuncle	..	..	..	..	..	..	..	..	..	..	..
144. Phlegmon, acute abscess	19	11	2	1	1	..	..	4	..	..	1
145. Other diseases of skin and adnexa..	12	5	4	..	..	..	..	4	..	..	..
IX.—Diseases of Locomotory System.											
146. Diseases of bones (non-tuberculous).	56	34	4	9	2	1	..	16	4	1	1
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism).	4	3	1	..	..	..	..	1	..	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	..	..	..	..	..	..	..	..	..	..	..
X.—Malformations.											
150. Congenital Malformations	221	126	117	5	1	2	..	125	..	1	..
XI.—Diseases of Infancy.											
151. Congenital debility, icterus and sclerema	897	485	..	..	..	..	..	485	..	..	..
151a. Injury during birth..	109	59	59	..	..	..	..	59	..	..	..
152. Other diseases peculiar to infancy	86	43	43	..	..	..	..	43	..	..	..
153. Neglect	3	2	2	..	..	..	..	2	..	..	..
XII.—Diseases of Old Age.											
154. Senile debility	365	125	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1	..	..	4	3	4	5	4	1	3	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	..	1	..	..	2	..	..	..	1	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	3	2	..	1	..	..	..	1	2	1	1	2	..
..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	.	..	..	..	..	5	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	18	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	...	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	.	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	..	..	9	19	29	26	42	..	..

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
XIII.—External Causes.											
155. Suicide by poison.....	35	16	..	..	..	..	..	..	..	..	2
156. Suicide by asphyxia..	35	27	..	..	..	..	..	..	..	..	1
157. Suicide by hanging or strangulation ..	25	18	..	..	..	..	..	..	..	..	..
158. Suicide by drowning..	..	..	..	..	..	..	..	..	..	..	..
159. Suicide by firearms...	56	51	..	..	..	..	..	..	..	..	2
160. Suicide by cutting instruments	13	11	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height...	10	3	..	..	..	..	..	..	..	..	..
162. Suicide by crushing...	..	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods...........	..	..	..	..	..	..	..	..	..	..	..
164. Fractures.............	48	42	1	..	..	2	..	3	3	2	1
165. Dislocations..........	..	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries..............	414	342	1	2	4	4	8	19	31	9	19
167. Burn, by fire, scald...	123	46	1	8	7	5	5	26	5	3	2
168. Burning by corrosive substances....	1	1	..	..	..	..	..	..	..	..	..
169. Sunstroke	71	52	12	3	..	..	..	15	1	..	..
170. Freezing	2	2	..	..	..	..	..	..	..	..	..
171. Electrical shock......	13	13	..	..	..	..	..	..	..	..	2
172. Accidental drowning.	138	127	1	..	1	1	..	3	5	4	14
173. Inanition (starvation)	1	1	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal	87	58	..	..	..	..	..	..	..	1	1
175. Other acute poisoning	23	16	1	1	2	2	1	7	..	..	..
176. Other external violence...............	72	46	..	1	..	..	..	1	..	1	6
(of which) a. Homicide by blows	5	5	..	..	..	..	..	..	..	..	..
b. Homicide by sharp instruments ...	8	8	..	1	..	..	..	1	..	..	1
c. Homicide by gunshot.....	37	27	..	..	..	..	..	..	..	..	4
d. Homicide by poison	..	..	..	..	..	..	..	..	..	..	..
e. Homicide by other methods.	2	1	..	..	..	..	..	..	..	..	..
XIV.—Ill-defined or Not Specified Causes.											
177. Dropsy................	..	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal..........	..	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes.....	379	187	160	23	2	1	1	187	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
..	1	3	2	..	1	2	1	3	..	1	..	..	..	..	..
1	4	2	2	1	5	3	2	2	2	1	1	..	..	..	..
2	1	1	1	..	5	2	3	1	1	..	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	4	4	4	8	6	7	4	4	4	2	1	..	..	..	..
..	..	3	1	2	1	2	..	..	..	..	..	1	1	..	..
1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	3	2	4	..	5	5	3	2	4	..	2	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	36	33	28	37	26	18	22	17	6	6	2	3	2	9	..
3	..	1	2	2	..	..	..	..	1	..	..	1	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	2	4	4	7	4	1	5	1	1	3	1	1	..	..	..
..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..
4	2	3	..	1	1	..	..	..	..	..	..	..	..	..	..
9	11	13	13	20	12	6	6	5	..	..	..	1	..	1	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
5	7	7	11	6	3	6	5	..	3	..	1	1	1	..	2
1	..	1	..	5	1	1	..	..	..	..	..	..	..	1	..
6	11	10	6	4	..	1	..	..	..	..	..	..	..	4	..
2	2	1	..	..	..	..	..	..	..	..	..	..	..	1	..
..	2	..	3	1	..	..	..	..	..	..	..	..	..	..	..
3	7	7	2	3	..	1	..	..	..	..	..	..	..	3	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	.	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General diseases...	6,136	3,270	203	191	115	99	52	660	143	43	128
a. Tuberculous diseases...	2,809	1,680	46	31	20	14	9	120	24	14	86
b. Cancer........	899	313	2	..	..	..	..	2	1	..	2
II.—Diseases of nervous system and organs of sense..	2,413	1,220	178	72	43	24	29	346	75	30	37
III.—Diseases of circulatory system..	2,192	1,088	16	1	1	4	2	24	18	12	23
IV.—Diseases of respiratory system..	4,055	2,158	546	245	97	36	22	946	48	16	30
V.—Diseases of digestive system...	3,306	1,767	933	189	36	19	8	1,185	33	28	17
VI.—Diseases of genito-urinary system	2,184	1,127	12	5	6	4	2	29	17	8	8
VII.—Puerperal diseases.	275	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of skin and cellular tissue....	87	47	6	2	4	..	..	12	2	..	1
IX.—Diseases of locomotory system...	60	37	5	9	2	1	..	17	4	1	1
X.—Malformations.....	221	126	117	5	1	2	..	125	..	1	..
XI.—Diseases of infancy	1,095	589	589	..	..	..	..	589	..	..	..
XII.—Diseases of old age	365	125	..	..	..	..	..	..	..	..	..
XIII.—External causes...	1,167	875	17	15	14	14	14	74	45	20	50
a. Suicide	174	129	..	..	..	..	..	..	..	..	5
b. Homicide.......	52	41	..	1	..	..	..	1	..	..	5
c. Accident........	941	705	17	14	14	14	14	73	45	20	40
XIV.—Causes ill-defined..	379	187	160	23	2	1	1	187	..	..	..
Total males.......	....	12,616	2,782	757	321	204	130	4,194	385	159	295
" females	....	11,319	2,368	618	320	181	113	3,600	350	211	312
" both sexes.	....	23,935	5,150	1,375	641	385	243	7,794	735	370	607

Deaths of Females by Age, and Cause of Death,

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total. Under 5.	5	10	15
I.—General Diseases.										
1. Typhoid fever..................	121	1	..	1	2	1	5	5	11	19
2. Typhus fever....................	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever................	..	..	..	..	..	..	..	..	..	..
4. Malarial fever..................	12	..	..	1	..	..	1	1	1	..
5. Smallpox........................	5	..	1	..	1	..	2	..	..	..
6. Measles	94	34	25	17	8	2	86	6	..	1

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.	Chinese.
228	254	322	306	285	220	184	152	119	115	52	37	18	4	75	3
171	194	255	217	195	148	99	70	39	41	6	..	1	..	54	2
6	6	12	10	24	23	39	46	51	40	22	19	6	4	1	..
19	33	33	39	53	58	59	74	89	94	78	57	29	17	26	..
23	46	56	68	72	82	82	116	129	107	96	72	37	25	23	2
54	82	85	126	108	110	104	92	98	88	71	52	29	19	58	1
25	33	40	41	46	52	51	57	48	48	28	19	8	8	34	1
32	52	67	58	73	102	102	101	127	132	83	64	54	18	16	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	1	..	1	2	..	4	3	5	5	4	1	3	..	..
1	..	..	3	4	..	1	..	..	..	1	2	1	1	2	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	20	..
..	..	..	..	..	..	..	..	..	9	19	29	26	42	..	..
69	82	88	84	93	70	54	52	37	22	13	9	8	5	15	3
8	10	14	11	11	18	16	10	10	7	4	3	1	1	..	..
5	11	8	6	4	..	1	..	..	..	..	..	..	..	4	..
56	61	66	67	78	52	37	42	27	15	9	6	7	4	11	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..
453	583	692	725	735	696	637	648	650	620	446	345	211	142	279	10
448	515	502	542	495	495	520	546	623	655	570	459	267	209	295	..
901	1,098	1,194	1,267	1,230	1,191	1,157	1,194	1,273	1,275	1,016	804	478	351	574	10

for Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
24	12	13	14	5	4	2	4	..	2	..	1	..	..	4
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	..	..	1	2	..	1	..	2	..	1	..	..	..	..
..	1	..	1	..	1	..	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	2

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
7. Scarlet fever	94	7	9	15	16	6	53	34	3	..
8. Whooping cough	65	26	21	9	4	1	61	4	..	..
9. Diphtheria and croup	286	17	46	62	38	30	193	75	9	1
10. Influenza	77	7	..	..	1	..	8	1	1	7
11. Miliary fever	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..
14. Dysentery	46	7	1	1	..	..	9	2	1	..
15. Plague	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	..	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..
18. Erysipelas	32	11	2	..	..	..	13	..	1	2
19. Other epidemic diseases	2	1	..	1	..	..	2	..	..	..
20. Pyæmia, septicæmia	4	1	..	1	..	..	2	..	..	..
21. Glanders	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia	1	..	..	..	..	1	1	..	..	..
24. Actinomycosis	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	11	..	..	..	..	..	..	1	..	1
27. Tuberculosis of lungs	960	6	4	1	4	3	18	6	21	114
28. Tubercular meningitis	81	20	16	14	4	3	57	11	5	3
29. Abdominal tuberculosis	35	6	4	..	..	2	12	1	1	1
30. Pott's disease	10	..	1	1	1	..	3	..	1	..
31. Cold abscess	..	..	..	..	..	..	..	..	..	..
32. White swelling	2	..	..	..	..	1	1	..	..	..
33. Tuberculosis of other organs	15	2	1	..	..	..	3	2	..	..
34. General tuberculosis	15	1	1	2	..	1	5	1	2	1
35. Scrofula	3	1	1	..	1	..	3	..	..	..
36. Syphilis	25	13	1	..	..	..	14	..	..	..
37. Gonorrhœa (adults)	3	..	..	..	..	..	..	..	1	1
38. Gonorrhœa (children)	1	1	..	..	..	..	1	..	..	..
39. Cancers, etc., of the mouth	5	..	..	1	..	..	1	..	..	..
40. Cancer of stomach, liver	200	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum	55	..	..	..	..	..	..	..	..	..
42. Cancer of female genital organs	169	..	..	..	..	..	..	..	..	..
43. Cancer of the breast	108	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
1	..	3	..	..	..	..	..	..	..	..	..	..	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
1	3	..	2	..	..	..	1	1	..	..	..	..	..	4
3	2	2	2	3	2	4	3	7	7	8	7	8	2	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	1	1	1	3	5	4	2	1	9	3	3	1
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1	..	..	1	2	3	3	2	1	..	1	1	1	..	1
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2	1	1	..	1	1	..	..	..	2	1	..	..	..	1
157	171	138	104	81	39	37	26	18	23	5	1	..	1	35
2	1	1	1	..	..	..	..	..	..	..	..	..	..	2
1	3	2	4	2	1	3	1	1	2	..	..	..	..	3
1	1	..	1	1	..	1	1	..	..	..	..	..	..	..
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1	3	..	..	1	2	..	1	..	..	..	1	..	1	..
..	1	..	2	3	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
2	3	1	1	4	..	..	..	..	..	..	..	..	..	2
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	1	1	1	1	..	..
1	3	3	5	11	27	34	28	26	31	20	7	3	1	4
..	..	2	4	7	9	7	8	5	5	3	4	1	..	..
..	5	14	17	27	27	23	15	9	13	12	6	..	1	4
..	1	3	9	16	14	13	11	11	18	5	5	2	..	1

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
44. Cancer of the skin............	2	..	..	..	..	..	..	..	..	..
45. Cancer of other organs and unspecified................	47	..	..	..	..	..	..	2	1	..
46. Other tumors (except of female genital organs).........	8	..	..	..	..	..	..	..	..	..
47. Acute articular rheumatism....	78	1	1	..	2	3	7	9	12	7
48. Chronic rheumatism and gout..	23	..	..	..	..	..	..	1	..	..
49. Scurvy........................	1	1	..	..	..	..	1	..	..	..
50. Diabetes......................	110	..	..	..	..	..	..	1	2	..
51. Exophthalmic goitre...........	3	..	..	..	..	..	..	..	..	1
52. Addison's disease..............	3	..	..	..	..	..	..	..	..	..
53. Leukæmia......................	8	2	..	..	..	..	2	1	..	..
54. Anæmia, chlorosis..............	26	2	..	..	1	..	3	..	1	1
55. Other general diseases..........	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic..	18	..	..	..	..	..	..	..	..	..
57. Lead poisoning.................	..	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	1	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings.......	1	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.										
60. Encephalitis...................	3	..	..	..	..	..	..	..	..	..
61. Simple meningitis..............	302	47	36	29	21	11	144	65	26	15
61a. (Of which) cerebro-spinal meningitis................	217	24	18	19	20	9	90	52	24	12
62. Locomotor ataxia..............	8	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord...	20	1	..	1	..	..	2	..	..	1
64. Apoplexy, congestion of brain..	599	3	2	..	..	..	5	1	2	..
65. Softening of brain..............	13	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified............	33	..	..	..	..	..	..	1	..	..
67. General paresis.................	22	..	..	..	..	..	..	..	1	..
68. Other forms of insanity	14	..	..	..	..	..	..	..	..	..
69. Epilepsy.......................	16	..	..	..	..	..	..	..	..	1
70. Convulsions (not puerperal)....	2	..	..	..	..	..	..	..	1	1
71. Convulsions of infants..........	117	100	10	4	3	..	117	..	..	..
72. Tetanus, trismus...............	10	3	..	..	..	..	3	1	..	..
73. Chorea	1	..	..	..	..	..	..	..	1	..
74. Other nervous diseases	26	..	4	..	..	1	5	2	2	..
75. Diseases of the eye.............	1	..	..	..	..	..	..	..	..	..
76. Diseases of the ears	6	2	1	..	1	..	4	..	..	1

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
..	..	..	..	..	..	..	..	..	..	..	1	1	..	..
2	1	1	5	5	4	8	2	7	2	2	3	..	2	1
..	..	..	..	2	1	..	..	1	1	..	2	1	..	..
5	1	1	6	7	3	1	4	7	2	2	3	1	..	2
..	..	1	2	..	..	4	1	4	4	2	2	2	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	4	1	2	2	3	10	21	21	17	11	9	3	3	1
..	..	..	1	..	..	..	..	..	..	1	..	..	..	1
..	..	..	1	1	..	1	..	..	..	..	..	..	..	..
..	..	1	..	..	1	2	..	1	..	..	..	..	..	..
1	1	1	1	3	3	2	..	2	3	2	2	..	..	..
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..	..	5	2	3	3	1	1	1	2	..	..	..	..	..
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..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
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18	4	10	5	5	2	2	..	2	2	1	..	..	1	7
17	2	8	4	4	1	1	..	1	1	..	..	..	..	3
..	..	..	1	..	1	1	..	2	1	2	..	..	..	..
..	..	1	..	1	2	3	2	1	4	3	..	..	..	..
2	3	3	11	30	39	50	70	79	82	79	86	34	23	10
..	..	..	..	..	1	..	..	1	2	4	4	1	..	..
..	..	2	..	1	3	1	2	5	7	8	1	2	..	..
..	..	1	1	3	2	..	2	..	5	4	2	..	1	1
1	..	3	3	..	1	1	1	1	..	1	2	..	..	1
3	3	..	..	3	3	..	..	1	1	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
1	1	2	1	1	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	3	1	4	1	2	2	1	2	1	..	..	..	..	..
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
III.—Diseases of Circulatory System.										
77. Pericarditis	7	..	..	..	..	..	..	..	..	1
78. Acute endocarditis	138	1	1	..	1	..	3	3	5	11
79. Organic heart diseases	846	7	1	..	2	3	13	14	31	24
80. Angina pectoris	35	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc	31	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis	32	1	..	1	..	..	2	1	..	..
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	7	..	..	..	..	..	..	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	2	..	1	..	..	..	1	..	..	..
85. Hæmorrhage	6	2	1	..	1	1	5	..	..	1
86. Other diseases of circulatory system	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.										
87. Diseases of nasal fossae	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx	11	3	2	1	4	..	10	1	..	..
89. Diseases of thyroid gland	1	..	..	..	..	..	..	..	..	..
90. Acute bronchitis	228	123	29	9	..	5	166	5	3	4
91. Chronic bronchitis	109	5	1	2	..	..	8	1	..	..
92. Broncho-pneumonia	457	160	96	43	12	7	318	13	7	2
93. Pneumonia	982	152	90	40	20	12	314	27	14	27
94. Pleurisy	32	1	..	3	2	..	6	1	2	2
95. Congestion of lungs, pulmonary apoplexy	12	7	..	..	..	..	7	1	..	..
96. Gangrene of lung	..	..	..	..	..	..	..	..	..	..
97. Asthma	42	..	1	..	..	..	1	..	..	..
98. Pulmonary emphysema	5	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	18	..	1	..	..	..	1	..	..	..
V.—Diseases of Digestive System.										
100. Diseases of mouth and adnexa	..	..	..	..	..	..	..	..	..	..
101. Diseases of pharynx	6	1	..	2	1	..	4	..	..	..
102. Diseases of œsophagus	..	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach	23	2	..	..	..	..	2	2	..	..
104. Other diseases of stomach (cancer excepted)	82	24	4	4	3	..	35	1	2	..
105. Diarrhœa and enteritis (under two years)	917	765	152	..	..	..	917	..	..	..
(Of which) chronic diarrhœa	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over)	147	..	..	30	10	3	43	12	3	2
107. Intestinal parasites	..	..	..	..	..	..	..	..	..	..
108. Hernia, intestinal obstruction	103	7	2	1	..	1	11	2	..	1
109. Other diseases of intestines	4	..	..	..	..	..	..	1	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	2	1	1	..	..	1	1	..	..	..	..	..	..	..
6	4	4	8	9	9	8	9	14	18	12	8	6	1	1	..
18	22	31	44	55	49	67	76	103	82	95	67	33	22	16	..
..	..	..	4	5	3	4	6	1	3	5	2	2	..	3	..
..	..	..	..	1	3	1	1	3	5	4	6	5	2	..	..
1	1	3	1	2	4	1	4	3	2	2	1	2	2	2	..
..	1	..	..	1	..	1	..	1	2	1	..	..	..	..	..
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..	1	..	3	1	1	..	3	3	7	11	9	8	3	12	..
1	7	2	2	2	3	6	13	15	13	13	8	9	6	2	..
3	3	7	1	6	5	6	9	17	19	11	14	12	4	12	..
36	38	36	54	34	39	51	48	56	72	62	36	22	16	29	..
2	4	2	2	2	2	2	..	1	2	..	1	..	1	..	..
..	1	..	..	..	..	..	..	..	1	..	2	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	2	2	5	7	8	5	8	2	2	..	..	..
..	1	..	1	1	..	1	..	..	1	..	..	..	..	..	..
2	1	..	4	2	2	1	..	1	..	3	1	..	..	1	..
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..	3	..	3	5	2	2	..	..	..	1	2	1	..	1	..
1	2	3	3	1	4	2	3	6	6	11	1	1	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	24	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	1	4	3	4	9	2	5	11	13	6	10	11	2	5	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	4	4	7	2	9	10	5	14	11	11	1	2	1	1	..
..	..	..	..	..	..	1	..	..	1	..	..	..	1	..	..

Cause of Death.	All ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
110. Acute yellow atrophy of liver...	2	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver.........	..	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver..............	133	..	..	..	..	..	..	..	..	..
113. Biliary calculi..................	13	..	..	..	..	..	..	..	..	..
114. Other diseases of liver..........	28	..	..	..	..	..	..	..	..	..
115. Diseases of spleen..............	2	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal)	4	..	..	..	..	..	..	..	..	1
117. Other diseases of digestive system (except tuberculosis and cancer).................	1	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess..	74	..	..	..	..	..	..	4	14	11
VI.—Diseases of Genito-urinary System.										
119. Acute nephritis.................	101	2	4	2	2	1	11	5	5	6
120. Bright's disease.................	838	4	1	2	..	..	7	2	5	7
121. Other diseases of kidneys and adnexa......................	11	..	..	..	..	..	..	..	..	1
122. Urinary calculus................	2	..	..	..	..	..	..	..	..	..
123. Diseases of bladder.............	4	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc..................	2	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate........	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs...............	..	..	..	..	..	..	..	..	..	..
127. Metritis	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)...................	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer).....	25	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus........	6	..	..	..	..	..	..	..	..	..
131. Ovarian cysts and tumors	31	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs..............	37	..	..	..	..	..	..	..	..	5
133. Diseases of breast (not puerperal, nor cancer)............	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.										
134. Accidents of pregnancy.........	49	..	..	..	..	..	..	..	..	2
135. Puerperal hæmorrhage.........	17	..	..	..	..	..	..	..	..	1
136. Other accidents of labor........	42	..	..	..	..	..	..	..	1	2
137. Puerperal septicæmia...........	100	..	..	..	..	..	..	..	..	7
138. Puerperal albuminuria and convulsions.................	56	..	..	..	..	..	..	..	..	7
139. Puerperal phlegmasia alba dolens	1	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death................	9	..	..	..	..	..	..	..	..	1
141. Puerperal diseases of breast....	1	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
..	..	..	..	..	1	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	10	11	11	27	14	16	13	9	11	6	3	..	..
..	1	..	1	..	..	3	3	3	1	1	..	..	..	..
2	1	3	4	..	3	1	2	2	4	5	..	..	1	1
..	..	..	..	1	..	1	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	1	..	1	..	..	..	..	..
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
10	8	6	6	4	..	4	1	4	..	..	1	1	..	1
3	7	15	9	9	3	6	10	4	2	5	..	1	..	1
33	46	53	64	48	76	62	84	86	96	57	58	36	18	12
1	1	1	2	..	1	1	..	..	1	1	1	..	..	..
..	..	..	..	..	..	1	..	..	1	..	..	..	..	..
..	..	..	..	..	..	1	..	1	..	..	1	1	..	..
1	..	..	..	..	..	..	1	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	2	4	3	6	4	3	1	..	1	..	..	..	2
3	1	1	..	..	1	..	..	..	..	..	..	..	..	..
4	6	7	3	3	..	4	3	..	1	..	..	..	..	1
4	10	6	6	4	2	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	12	14	7	4	..	..	..	..	..	..	..	..	..	..
..	7	3	6	..	..	..	..	..	..	..	..	..	..	..
3	12	7	11	6	..	..	..	..	..	..	..	..	..	3
17	34	20	15	6	1	..	..	..	..	..	..	..	..	3
11	9	14	9	4	2	..	..	..	..	..	..	..	..	3
..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
1	3	2	..	..	2	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
VIII.—Diseases of Skin and Cellular Tissue.										
142. Gangrene	25	..	..	1	..	2	3	1	..	..
143. Carbuncle	..	..	..	..	..	..	..	..	..	..
144. Phlegmon, acute abscess	8	..	..	..	..	1	1	..	1	1
145. Other diseases of skin and adnexa	7	1	..	..	..	..	1	..	..	..
IX.—Diseases of Locomotory System										
146. Diseases of bones (non-tuberculous)	22	5	2	2	1	..	10	..	3	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	1	..	..	..	..	..	..	..	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	..	..	..	..	..	..	..	..	..	..
X.—Malformations.										
150.—Congenital malformations	95	92	2	..	..	..	94	1	..	..
XI.—Diseases of Infancy.										
151. Congenital debility, icterus and sclerema	412	411	1	..	..	..	412	..	..	..
151a. Injury during birth	50	50	..	..	..	..	50	..	..	..
152. Other diseases peculiar to infancy	43	43	..	..	..	..	43	..	..	..
153. Neglect	1	1	..	..	..	..	1	..	..	..
XII.—Diseases of Old Age.										
154. Senile debility	240	..	..	..	..	..	..	..	..	..
XIII.—External Causes.										
155. Suicide by poison	19	..	..	..	..	..	..	..	..	2
156. Suicide by asphyxia	8	..	..	..	..	..	..	..	..	..
157. Suicide by hanging or strangulation	7	..	..	..	..	..	..	..	..	..
158. Suicide by drowning	..	..	..	..	..	..	..	..	..	..
159. Suicide by firearms	2	..	..	..	..	..	..	..	..	..
160. Suicide by cutting instruments	2	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height	7	..	..	..	..	..	..	..	..	..
162. Suicide by crushing	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods	..	..	..	..	..	..	..	..	..	..
164. Fractures	6	..	..	..	..	1	1	..	..	..
165. Dislocations	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries	72	3	..	7	4	1	15	12	2	1
167. Burn, by fire, scald	77	4	8	4	9	8	33	6	5	1
168. Burning by corrosive substances	..	..	..	..	..	..	..	..	..	..
169. Sunstroke	19	6	1	1	..	..	8	..	..	1
170. Freezing	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
..	..	..	..	1	..	1	4	3	4	1	3	3	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	1	..	1	1	..	2	..	..	..	1
1	..	..	1	..	2	..	..	1	..	1	..	..	..	2
1	1	1	2	1	1	1	..	..	..	..	..	..	..	2
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	17
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	1	..	9	19	38	49	39	85	3
2	6	2	2	..	2	..	1	..	..	..	1	1	..	..
..	2	1	1	1	..	1	1	1	..	..	..	..	..	..
2	1	..	..	..	2	1	..	1	..	..	..	..	..	..
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..	2	1	1	..	1	..	..	..	..	1	1	..	..	..
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1	..	..	..	1	..	2	..	1	..	..	..	..	..	..
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1	2	2	4	4	..	5	3	3	6	3	4	2	3	6
6	2	2	5	3	2	2	3	2	1	2	1	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	1	1	..	..	..	..	..	..	1	1	..	..	2
..	..	..	..	..	..	..	..	3	..	..	..	..	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
171. Electrical shock	..	..	..	..	..	..	..	..	..	..
172. Accidental drowning	11	..	..	..	..	..	..	..	1	..
173. Inanition (starvation)	..	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal	29	..	..	..	..	..	..	..	..	..
175. Other acute poisoning	7	..	1	2	..	..	3	..	..	..
176. Other external violence	26	2	..	..	..	1	3	..	..	1
(Of which) a. Homicide, by blows	..	..	..	..	..	..	..	..	..	..
b. Homicide, by sharp instruments	..	..	..	..	..	..	..	..	..	..
c. Homicide, by gunshot	10	..	..	..	..	..	..	..	..	1
d. Homicide, by poison	..	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods	1	..	..	..	..	..	..	..	..	..
XIV.—Ill-defined or not Specified Causes.										
177. Dropsy	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes	192	159	28	2	1	..	190	..	..	..
I.—General diseases	2,866	168	135	127	83	54	567	164	74	160
a. Tuberculous diseases	1,129	35	27	18	9	10	99	22	30	120
b. Cancer	586	..	..	1	..	..	1	2	1	..
II.—Diseases of nervous system and organs of sense	1,193	156	53	34	25	12	280	70	33	19
III.—Diseases of circulatory system	1,104	11	4	1	4	4	24	18	36	37
IV.—Diseases of respiratory system	1,897	451	220	98	38	24	831	49	26	35
V.—Diseases of digestive system.	1,539	799	158	37	14	4	1,012	22	19	15
VI.—Diseases of genito-urinary system	1,057	6	5	4	2	1	18	7	10	19
VII.—Puerperal diseases	275	..	..	..	..	..	..	..	1	20
VIII.—Diseases of the skin and cellular tissue	40	1	..	1	..	3	5	1	1	1
IX.—Diseases of locomotory system	23	5	2	2	1	..	10	..	3	..
X.—Malformations	95	92	2	..	..	..	94	1	..	..
XI.—Diseases of infancy	506	505	1	..	..	..	506	..	..	..
XII.—Diseases of old age	240	..	..	..	..	..	..	..	..	..
XIII.—External causes	292	15	1c	14	13	11	63	18	8	6
a. Suicide	45	..	..	..	..	..	..	..	..	2
b. Homicide	11	..	..	..	..	..	..	..	..	1
c. Accident	236	15	10	14	13	11	63	18	8	3
XIV.—Causes ill-defined	192	159	28	2	1	..	190	..	..	..
Total females	11,319	2,368	618	320	181	113	3,600	350	211	312

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	..	..	3	1	1	1	1	..	..	1	..	..	..	..	..
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2	3	3	3	4	1	6	2	1	2	1	1	..	..	1	..
..	..	2	..	..	1	1	..	..	..	..	..	..	..	..	..
4	7	4	2	2	1	2	..	..	..	..	..	..	..	2	..
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2	2	1	..	1	1	2	..	..	..	..	..	..	..	1	..
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..	..	..	..	1	1	..	..	..	..	..	..	..	..	14	..
210	218	195	191	190	150	160	136	129	137	79	65	27	14	81	..
164	181	142	112	89	43	41	30	19	27	6	2	..	2	39	..
3	10	23	40	66	81	85	64	58	70	43	27	8	4	10	..
25	14	24	26	45	56	61	79	96	105	103	95	37	25	21	..
25	28	40	58	74	68	82	97	126	113	119	84	48	27	22	..
44	56	47	67	50	54	73	80	101	120	108	73	53	30	58	..
29	22	31	38	28	56	41	36	53	46	46	21	19	5	34	..
49	72	85	88	67	89	79	101	92	101	64	60	38	18	16	..
42	77	60	49	20	5	..	..	..	1	..	..	..	..	9	..
1	..	..	1	1	3	1	5	5	4	4	3	3	1	3	..
1	1	1	2	2	1	1	1	..	..	..	..	..	..	2	..
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..	..	..	..	..	..	..	..	..	..	..	..	..	..	19	..
..	..	..	..	..	..	1	..	9	19	38	49	39	85	3	..
22	27	19	22	17	12	21	11	12	9	9	9	3	4	12	..
4	12	5	4	2	6	2	2	2	..	1	2	1	..	1	..
2	2	1	1	1	1	2	..	..	..	..	..	..	..	1	..
16	13	13	17	14	5	17	9	10	9	8	7	2	4	10	..
..	..	..	..	1	1	..	..	..	..	..	..	..	..	14	..
448	515	502	542	495	495	520	546	623	655	570	459	267	209	295	..

BOROUGH OF

Deaths of Males by Age, and Cause of Death,

Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.											
1. Typhoid fever	31	19	..	..	..	..	..	..	..	1	1
2. Typhus fever	..	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever	..	..	..	..	..	..	..	..	..	..	..
4. Malarial fever	4	1	..	..	..	..	..	..	..	..	..
5. Small pox	..	..	..	..	..	..	..	..	..	..	..
6. Measles	11	3	1	1	..	..	..	2	1	..	..
7. Scarlet fever	15	4	1	1	1	..	..	3	1	..	..
8. Whooping cough	22	12	9	1	2	..	..	12	..	..	..
9. Diphtheria and croup	72	33	1	4	6	7	6	24	9	..	..
10. Influenza	17	7	..	1	..	..	..	1	..	..	..
11. Miliary fever	..	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..	..
14. Dysentery	15	7	1	..	1	1	..	3	..	..	..
15. Plague	..	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	..	..	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..	..
18. Erysipelas	6	2	1	..	..	..	..	1	..	..	..
19. Other epidemic diseases	..	..	..	..	..	..	..	..	..	..	..
20. Pyæmia, septicæmia	9	6	3	..	..	..	..	3	1	..	..
21. Glanders	..	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule	1	1	..	..	..	..	..	..	..	..	..
23. Hydrophobia	..	..	..	..	..	..	..	..	..	..	..
24. Actinomycosis	..	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	5	4	..	..	..	..	..	..	..	..	1
27. Tuberculosis of lungs	278	162	..	..	..	..	..	..	1	..	7
28. Tubercular meningitis	27	14	2	4	2	2	..	10	1	1	..
29. Abdominal tuberculosis	2	2	1	..	..	..	..	1	..	..	..
30. Pott's disease	1	..	..	..	..	..	..	..	..	..	..
31. Cold abscess	..	..	..	..	..	..	..	..	..	..	..
32. White swelling	1	1	..	..	..	..	..	..	1	..	..
33. Tuberculosis of other organs	5	2	..	..	..	..	..	..	..	..	..

QUEENS.

for Year ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
3	4	3	5	1	..	1	..	..	..	..	..	..	..	1	..
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1	..	1	..	..	..	..	1	2	..	1	..	..	..	..	..
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..	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..
17	25	21	27	27	14	10	4	6	2	..	1	..	..	6	..
..	2	..	..	..	..	..	..	..	..	..	..	..	..	1	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
34. General tuberculosis...	2	1	..	..	..	..	..	..	..	..	..
35. Scrofula................	..	..	..	..	..	..	..	..	..	..	..
36. Syphilis................	6		1	..	..	..	..	1	..	..	..
37. Gonorrhœa (adults)....	..	..	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children) .	..	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth..............	2	2	..	..	..	..	..	..	..	..	..
40. Cancer of stomach, liver................	42	19	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum.............	13	6	..	..	..	..	..	..	..	..	..
42. Cancer of female genital organs.....	16	..	..	..	..	..	..	..	..	..	..
43. Cancer of the breast...	9	..	..	..	..	..	..	..	..	..	..
44 Cancer of the skin.....	2	2	..	..	..	..	..	..	..	..	..
45. Cancer of other organs and unspecified	14	9	1	..	..	..	1	2	..	..	..
46. Other tumors (except of female genital organs)	1	..	..	..	..	..	..	..	..	..	..
47. Acute articular rheumatism............	3	..	..	..	..	..	..	..	..	..	..
48. Chronic rheumatism and gout...........	3	1	..	..	..	..	..	..	..	..	..
49. Scurvy.................	..	..	..	..	..	..	..	..	..	..	..
50. Diabetes...............	22	13	..	..	..	1	..	1	1	..	..
51. Exophthalmic goitre ..	..	..	..	..	..	..	..	..	..	..	..
52. Addison's disease......	2	1	..	..	..	..	..	..	..	..	..
53. Lukæmia...............	3	2	..	..	..	..	..	..	..	..	..
54. Anæmia, chlorosis.....	3	1	..	..	..	..	..	..	..	..	..
55. Other general diseases.	..	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, Acute and Chronic.......	14	12	..	..	..	..	..	..	..	..	..
57. Lead poisoning........	..	..	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation.	..	..	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings	..	..	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.											
60. Encephalitis...........	..	..	..	..	..	..	..	..	..	..	..
61. Simple meningitis.....	91	48	11	6	2	2	2	23	6	6	6
61a. (of which) Cerebro-spinal meningitis.	48	25	2	3	2	1	..	8	4	4	5
62. Locomotor ataxia.....	2	2	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord........	7	4	1	1	..	..	..	2	..	..	..
64. Apoplexy, congestion of brain............	168	82	1	..	..	..	..	1	..	..	..
65. Softening of brain.....	3	1	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified...	6	5	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
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..	1	..	1	..	..	..	..	2	2	..	..	..	..	1	..
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..	..	1	..	..	1	..	1	2	1	1	..	..	..	..	..
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..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
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..	..	1	1	2	3	..	..	1	..	2	1	..	..	1	..
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..	1	1	2	4	1	..	2	..	1	..	..	..	..	1	..
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2	1	..	..	2	..	2	..	..	..	..	..	..	..	..	..
2	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..
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..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..
1	2	4	4	1	9	6	8	10	13	9	7	3	4	..	..
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Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
67. General paresis........	21	16	..	..	..	..	..	..	..	..	..
68. Other forms of insanity	4	3	..	..	..	..	..	..	..	..	..
69. Epilepsy...............	5	4	1	..	..	..	..	1	..	..	2
70. Convulsions (not puerperal)............	2	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants.	31	14	9	3	..	..	1	13	..	..	1
72. Tetanus, trismus......	3	3	2	..	..	..	..	2	..	..	..
73. Chorea	..	..	..	..	..	..	..	..	..	..	..
74. Other nervous diseases	6	3	1	..	..	..	..	1	1	..	..
75. Diseases of the eyes..	..	..	..	..	..	..	..	..	..	..	..
76. Diseases of the ears....	1	..	..	..	..	..	..	..	..	..	..
III.—Diseases of Circulatory System.											
77. Pericarditis............	4	2	..	..	..	..	..	..	1	..	..
78. Acute endocarditis.....	6	3	..	..	..	..	..	..	..	..	..
79. Organic heart diseases.	307	164	1	..	..	..	..	1	4	3	5
80. Angina pectoris........	2	1	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc......	8	3	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis.	9	4	..	..	..	..	..	..	..	..	..
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	..	..	..	..	..	..	..	..	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)...............	..	..	..	..	..	..	..	..	..	..	..
85. Hæmorrhage	1	..	..	..	..	..	..	..	..	..	..
86. Other diseases of circulatory system...	..	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.											
87. Diseases of nasal fossae	..	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx.	..	..	..	..	..	..	..	..	..	..	..
89. Diseases of thyroid gland..............	..	..	..	..	..	..	..	..	..	..	..
90. Acute bronchitis.......	71	41	25	4	..	1	..	30	..	1	..
91. Chronic bronchitis.....	11	6	..	..	..	..	..	..	..	..	..
92. Broncho-pneumonia ...	100	52	21	13	2	4	..	40	..	..	..
93. Pneumonia.............	284	165	40	10	4	2	3	59	8	3	6
94. Pleurisy	2	1	..	..	..	..	..	..	..	..	..
95. Congestion of lungs, pulmonary apoplexy	..	..	..	..	..	..	..	..	..	..	..
96. Gangrene of lung......	2	..	..	..	..	..	..	..	..	..	..
97. Asthma................	3	1	..	..	..	..	..	..	..	..	..
98. Pulmonary emphysema	3	1	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	2	1	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
V.—Diseases of Digestive System											
100. Diseases of mouth and adnexa.......	1	1	1	..	..	..	..	1	..	..	..
101. Diseases of pharynx..	1	..	..	..	..	..	..	..	..	..	..
102. Diseases of œsophagus	1	1	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach.....	4	1	..	..	..	..	..	..	..	..	..
104. Other diseases of stomach (cancer excepted)	5	3	..	1	..	..	..	1	1	..	..
105. Diarrhœa and enteritis (under two years).............	335	188	164	24	..	..	..	188	..	..	..
(Of which) chronic diarrhœa	..	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over)	29	7	..	..	5	1	..	6	..	..	..
107. Intestinal parasites...	..	..	..	..	..	..	..	..	..	..	..
108. Hernia, intestinal obstruction	20	11	2	..	..	..	..	2	..	..	1
109. Other diseases of intestines	2	1	..	..	..	..	..	..	..	..	..
110. Acute yellow atrophy of liver...........	..	..	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver	..	..	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver.....	41	27	..	..	..	..	..	..	..	..	1
113. Biliary calculi.........	3	..	..	..	..	..	..	..	..	..	..
114. Other diseases of liver	5	2	1	..	..	..	..	1	..	..	..
115. Diseases of spleen....	..	..	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal)...	13	5	2	..	..	..	..	2	..	..	..
117. Other diseases of digestive system (except tuberculosis and cancer).......	1	1	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess........	17	10	..	..	..	..	..	..	..	4	..
VI.—Diseases of Genito-urinary System.											
119. Acute nephritis.......	41	21	2	1	..	1	..	4	1	..	1
120. Bright's disease.......	226	126	1	..	..	..	..	1	..	2	3
121. Other diseases of kidneys and adnexa	2	..	..	..	..	..	..	..	..	..	..
122. Urinary calculus......	1	1	..	..	..	..	..	..	..	..	..
123. Diseases of bladder...	7	7	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc.	..	..	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate...............	..	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs.........	..	..	..	..	..	..	..	..	..	..	..
127. Metritis...............	..	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal) ...	..	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer)...........	..	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus.............	1	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
131. Ovarian cysts and tumors	1	..	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs	2	..	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal, nor cancer)	..	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.											
134. Accidents of pregnancy	10	..	..	..	..	..	..	..	..	..	..
135. Puerperal hæmorrhage	3	..	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	2	..	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia.	16	..	..	..	..	..	..	..	..	..	..
138. Puerperal albuminuria and convulsions	5	..	..	..	..	..	..	..	..	..	..
139. Puerperal phlegmasia alba dolens	..	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	1	..	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast	..	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.											
142. Gangrene	5	2	..	..	1	..	..	1	..	..	..
143. Carbuncle	1	1	..	..	..	..	..	..	..	..	..
144. Phlegmon, acute abscess	1	..	..	..	..	..	..	..	..	..	..
145. Other diseases of skin and adnexa	2	2	..	1	1	..	..	2	..	..	..
IX.—Diseases of Locomotory System.											
146. Diseases of bones (non-tuberculous)	2	2	..	1	..	..	..	1	..	..	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	..	..	..	..	..	..	..	..	..	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	..	..	..	..	..	..	..	..	..	..	..
X.—Malformations.											
150. Congenital malformations	12	8	7	..	..	1	..	8	..	..	..
XI.—Diseases of Infancy.											
151. Congenital debility, icterus and sclerema	150	95	93	1	1	..	..	95	..	..	..
151a. Injury during birth	3	2	2	..	..	..	..	2	..	..	..
152. Other diseases peculiar to infancy	5	4	4	..	..	..	..	4	..	..	..
153. Neglect	6	5	5	..	..	..	..	5	..	..	..
XII.—Diseases of Old Age.											
154. Senile debility	46	20	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored	Chinese.
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Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
XIII.—External Causes.											
155. Suicide by poison.....	12	6	..	..	..	..	..	..	..	..	..
156. Suicide by asphyxia ..	11	9	..	..	..	..	..	..	..	..	..
157. Suicide by hanging or strangulation...	12	11	..	..	..	..	..	..	..	..	..
158. Suicide by drowning..	1	1	..	..	..	..	..	..	..	..	..
159. Suicide by firearms...	20	19	..	..	..	..	..	..	..	..	..
160. Suicide by cutting instruments	2	2	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height...	..	..	..	..	..	..	..	..	..	..	..
162. Suicide by crushing...	..	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods...........	..	..	..	..	..	..	..	..	..	..	..
164. Fractures.............	1	1	..	..	..	..	..	..	..	1	..
165. Dislocations..........	..	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries..............	132	125	1	1	..	2	2	6	7	5	5
167. Burn, by fire, scald...	25	9	..	..	2	2	1	5	..	..	..
168. Burning by corrosive substances.........	1	1	..	..	..	..	..	..	..	..	..
169. Sunstroke............	10	8	4	..	..	..	..	4	..	..	..
170. Freezing..............	..	..	..	..	..	..	..	..	..	..	..
171. Electrical shock	1	1	..	..	..	..	..	..	..	..	..
172. Accidental drowning..	29	29	..	..	..	..	..	..	..	2	1
173. Inanition (starvation).	..	..	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal...............	5	5	..	..	..	..	..	..	..	..	..
175. Other acute poisoning	2	2	..	..	..	1	..	1	..	..	..
176. Other external violence	13	10	2	..	..	..	..	2	..	..	..
(Of which)											
a. Homicide, by blows.........	2	2	..	..	..	..	..	..	..	..	..
b. Homicide, by sharp instruments	2	2	..	..	..	..	..	..	..	..	..
c. Homicide, by gunshot	3	3	..	..	..	..	..	..	..	..	..
d. Homicide, by poison........	..	..	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods...........	..	..	..	..	..	..	..	..	..	..	..
XIV.—Ill-defined or Not Specified Causes.											
177. Dropsy...............	..	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal..........	..	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes	42	21	20	..	1	..	..	21	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
..	..	2	..	..	1	1	1	..	1	..	..	..	..	..	..
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2	3	1	..	1	..	1	..	..	..	..	..	..	..	..	..
..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General diseases...	678	350	22	12	12	11	7	64	16	2	9
a. Tuberculous diseases ...	321	186	3	4	2	2	..	11	3	1	8
b. Cancer........	98	38	1	..	..	..	1	2	..	..	..
II.—Diseases of nervous system and organs of sense.	350	185	26	10	2	2	3	43	7	6	9
III.—Diseases of circulatory system...	337	177	1	..	..	..	..	1	5	3	5
IV.—Diseases of respiratory system....	478	268	86	27	6	7	3	129	8	4	6
V.—Diseases of digestive system.....	478	258	170	25	5	1	..	201	1	4	2
VI.—Diseases of genito-urinary system..	281	155	3	1	..	1	..	5	1	2	4
VII.—Puerperal diseases.	37	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of skin and cellular tissue	9	5	..	1	2	..	..	3	..	..	..
IX.—Diseases of locomotory system..	2	2	..	1	..	..	..	1	..	..	..
X.—Malformations.....	12	8	7	..	..	1	..	8	..	..	..
XI.—Diseases of infancy	164	106	104	1	1	..	..	106	..	..	..
XII.—Diseases of old age.	46	20	..	..	..	..	..	..	..	..	..
XIII.—External causes....	277	239	7	1	2	5	3	18	7	8	6
a. Suicide........	58	48	..	..	..	..	..	..	..	..	..
b. Homicide.....	7	7	..	..	..	..	..	..	..	..	..
c. Accident......	212	184	7	1	2	5	3	18	7	8	6
XIV.—Causes ill defined ..	42	21	20	..	1	..	..	21	..	..	..
Total males.....	....	1,794	446	79	31	28	16	600	45	29	41
Total females ...	....	1,397	314	72	36	25	19	466	55	27	37
Total both sexes.	....	3,191	760	151	67	53	35	1,066	100	56	78

Deaths of Females by Age and Cause of Death,

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.										
1. Typhoid fever..................	12	..	1	..	..	1	2	..	..	2
2. Typhus fever..................	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever.................	..	..	..	..	..	..	..	..	..	..
4. Malarial fever...................	3	..	1	..	..	..	1	..	..	1
5. Smallpox	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
24	34	31	37	38	22	17	13	16	15	8	3	1	..	12	..
19	27	22	27	28	15	10	6	6	2	..	1	..	..	7	..
..	2	1	2	1	3	4	2	7	11	2	..	1	..	1	..
3	4	5	11	6	11	12	11	12	17	12	9	3	4	1	..
5	3	7	12	11	10	14	27	18	13	22	12	6	3	1	..
5	7	11	11	13	17	7	8	11	11	5	7	6	2	5	..
2	4	3	1	5	13	6	4	1	6	3	..	1	1	6	..
4	11	7	7	9	16	16	14	18	21	10	5	3	2	5	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	..	..	..	..	..	..	1	1	..	4	7	7	..	..
26	20	22	31	25	25	17	13	8	4	4	4	1	..	6	..
2	3	7	6	6	8	5	4	4	1	..	2	..	..	1	..
2	3	..	..	1	..	1	..	..	..	..	..	..	..	..	..
22	14	15	25	18	17	11	9	4	3	4	2	1	..	5	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
69	83	86	110	107	114	89	91	85	89	64	44	29	19	40	..
48	62	58	72	56	55	67	62	72	77	62	46	46	29	42	..
117	145	144	182	163	169	156	153	157	166	126	90	75	48	82	..

for Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
1	..	4	..	1	..	..	..	1	..	1	..	..	..	..
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
6. Measles	8	1	1	2	2	1	7	1	..	..
7. Scarlet fever	11	1	..	1	3	..	5	3	2	1
8. Whooping cough	10	7	1	1	1	..	10	..	..	..
9. Diphtheria and croup	39	2	3	4	3	8	20	16	2	..
10. Influenza	10	..	..	..	..	..	..	..	1	..
11. Miliary fever	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..
14. Dysentery	7	..	1	1	1	..	3	1	..	..
15. Plague	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	..	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..
18. Erysipelas	4	4	..	..	..	..	4	..	..	..
19. Other epidemic diseases	..	..	..	..	..	..	..	..	..	..
20. Pyæmia, septicæmia	3	2	..	1	..	..	3	..	..	..
21. Glanders	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia	..	..	..	..	..	..	..	..	..	..
24. Actinomycosis	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	1	..	..	..	..	..	..	..	..	..
27. Tuberculosis of lungs	116	..	..	..	..	..	..	..	2	15
28. Tubercular meningitis	13	3	5	1	..	..	9	1	..	..
29. Abdominal tuberculosis	..	..	..	..	..	..	..	..	..	..
30. Pott's disease	1	1	..	..	..	..	1	..	..	..
31. Cold abscess	..	..	..	..	..	..	..	..	..	..
32. White swelling	..	..	..	..	..	..	..	..	..	..
33. Tuberculosis of other organs	3	..	..	1	..	..	1	..	1	..
34. General tuberculosis	1	..	..	..	..	..	..	..	..	..
35. Scrofula	..	..	..	..	..	..	..	..	..	..
36. Syphilis	5	2	1	..	..	..	3	..	..	..
37. Gonorrhœa (adults)	..	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children)	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	..	..	..	..	..	..	..	..	..	..
40. Cancer of stomach, liver	23	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum	7	..	..	..	..	..	..	..	..	..
42. Cancer of female genital organs.	16	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	1	..	..	..	..	..	..	..	..	..	..	..	1
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1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	24	19	16	6	6	3	5	4	..	..	..	1	..	7
1	1	1	..	..	..	..	..	..	..	..	..	..	..	1
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..	1	..	1	..	..	4	3	5	3	4	2	..	..	..
..	..	..	..	2	1	1	1	1	..	1	..	..	..	..
..	..	..	1	3	3	5	2	1	..	..	..	1	..	..

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
43. Cancer of the breast.............	9	..	..	..	..	..	..	..	..	..
44. Cancer of the skin...............	..	..	..	..	..	..	..	..	..	..
45. Cancer of other organs and unspecified................	5	..	..	..	..	..	..	..	..	..
46. Other tumors (except of female genital organs)..............	1	..	..	..	..	..	..	..	..	..
47. Acute articular rheumatism.....	3	..	..	..	..	..	..	..	..	..
48. Chronic rheumatism and gout...	2	..	..	..	..	1	1	..	..	..
49. Scurvy..........................	..	..	..	..	..	..	..	..	..	..
50. Diabetes........................	9	..	..	..	..	..	..	..	..	..
51. Exophthalmic goitre.............	..	..	..	..	..	..	..	..	..	..
52. Addison's disease...............	1	..	..	..	..	..	..	..	..	1
53. Leukæmia........................	1	..	..	..	..	..	..	..	..	..
54. Anæmia, chlorosis...............	2	..	..	..	..	..	..	1	..	..
55. Other general diseases...........	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic...	2	..	..	..	..	..	..	..	..	..
57. Lead poisoning..................	..	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation..................	..	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings........	..	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.										
60. Encephalitis....................	..	..	..	..	..	..	..	..	..	..
61. Simple meningitis...............	43	11	4	5	3	1	24	7	1	5
(Of which) Cerebro-spinal meningitis	23	3	2	3	1	1	10	6	3	..
62. Locomotor ataxia...............	..	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord....	3	..	..	..	..	..	..	..	1	..
64. Apoplexy, congestion of brain...	86	1	..	..	..	..	1	1	..	..
65. Softening of brain...............	2	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified	1	..	..	..	..	..	..	..	..	..
67. General paresis..................	5	..	..	..	..	..	..	..	..	..
68. Other forms of insanity..........	1	..	..	..	..	..	..	..	..	..
69. Epilepsy.........................	1	..	..	..	..	..	..	1	..	..
70. Convulsions (not puerperal).....	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants..........	19	13	5	1	..	..	19	..	..	..
72. Tetanus, trismus................	..	..	..	..	..	...	..	..	..	..
73. Chorea..........................	..	..	..	..	..	..	..	..	..	..
74. Other nervous diseases..........	3	1	..	..	..	..	1	..	..	..
75. Diseases of the eyes.............	..	..	..	..	..	..	..	..	..	..
76. Diseases of the ears.............	1	..	..	..	..	..	..	..	..	1

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
..	..	1	2	..	1	..	3	..	2	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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..	..	..	1	..	..	1	..	4	1	2	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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2	..	2	..	2	..	..	..	..	..	..	..	..	..	2
2	..	1	..	1	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	..	1	..	..	..	..	..	..	..	..	..
..	1	..	3	3	8	12	6	10	17	8	7	5	4	4
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5	5	10	15
III.—Diseases of Circulatory System.										
77. Pericarditis	2	..	..	..	..	..	..	..	..	..
78. Acute endocarditis	3	..	..	..	..	..	..	..	..	..
79. Organic heart diseases	143	2	..	1	..	..	3	5	8	4
80. Angina pectoris	1	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc.	5	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis	5	..	..	..	1	..	1	..	..	..
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	..	..	..	..	..	..	..	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	..	..	..	..	..	..	..	..	..	..
85. Hæmorrhage	1	..	..	..	..	..	..	1	..	..
86. Other diseases of circulatory system	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.										
87. Diseases of nasal fossæ	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx	..	..	..	..	..	..	..	..	..	..
89. Diseases of thyroid gland	..	..	..	..	..	..	..	..	..	..
90. Acute bronchitis	30	14	2	2	..	..	18	..	..	..
91. Chronic bronchitis	5	..	..	..	..	..	..	..	..	..
92. Broncho-pneumonia	48	17	9	2	..	1	29	..	..	..
93. Pneumonia	119	27	8	3	3	2	43	5	1	2
94. Pleurisy	1	1	..	..	..	..	1	..	..	..
95. Congestion of lungs, pulmonary apoplexy	..	..	..	..	..	..	..	..	..	..
96. Gangrene of lung	2	..	..	..	..	..	..	..	..	..
97. Asthma	2	..	..	..	..	..	..	..	..	..
98. Pulmonary emphysema	2	..	1	..	..	..	1	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	1	..	..	..	..	..	..	..	..	..
V.—Diseases of Digestive System.										
100. Diseases of mouth and adnexa	..	..	..	..	..	..	..	..	..	..
101. Diseases of pharynx	1	..	..	..	..	1	1	..	..	..
102. Diseases of œsophagus	..	..	..	..	..	..	..	..	..	
103. Ulcer of stomach	3	..	..	..	..	..	..	..	..	..
104. Other diseases of stomach (cancer excepted)	2	..	..	..	..	..	..	..	..	..
105. Diarrhœa and enteritis (under two years)	147	126	21	..	..	..	147	..	..	..
(Of which) Chronic diarrhœa:										
106. Diarrhœa and enteritis (two years and over)	22	..	..	6	3	1	10	1	..	..
107. Intestinal parasites	..	..	..	..	..	..	..	..	..	..
108. Hernia, intestinal obstruction	9	1	..	..	..	..	1	..	..	..
109. Other diseases of intestines	1	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.
1	..	..	..	1	..	..	..	..	..	..	..	..	..	1
..	1	..	..	1	1	..	..	..	..	..	..	..	..	..
5	4	2	6	5	9	8	11	16	19	13	8	11	6	3
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
110. Acute yellow atrophy of liver ..	..	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver	..	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver...............	14	..	..	..	..	..	..	..	..	..
113. Biliary calculi	3	..	..	..	..	..	..	..	..	..
114. Other diseases of liver..........	3	..	..	..	..	..	..	..	..	..
115. Diseases of spleen..............	..	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal)	8	..	..	..	..	..	..	..	..	1
117. Other diseases of digestive system (except tuberculosis and cancer)..................	..	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess...	7	..	..	..	..	..	..	..	1	..
VI.—Diseases of Genito-urinary System.										
119. Acute nephritis.................	20	..	..	..	2	..	2	2	1	2
120. Bright's disease.................	100	..	..	..	1	..	1	..	1	2
121. Other diseases of kidneys and adnexa	2	..	..	..	..	..	..	..	..	..
122. Urinary calculus................	..	..	..	..	..	..	..	..	..	..
123. Diseases of bladder.............	..	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc..................	..	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate........	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs................	..	..	..	..	..	..	..	..	..	..
127. Metritis........................	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal).....................	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer).....	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus........	1	..	..	..	..	..	..	..	..	..
131. Ovarian cysts and tumors.......	1	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs	2	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal, or cancer)	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.										
134. Accidents of pregnancy.........	10	..	..	..	..	..	..	..	..	1
135. Puerperal hæmorrhage	3	..	..	..	..	..	..	..	..	..
136. Other accidents of labor........	2	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia...........	16	..	..	..	..	..	..	..	..	..
138. Puerperal albuminuria and convulsions..................	5	..	..	..	..	..	..	..	..	1
139. Puerperal phlegmasia alba dolens......................	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death................	1	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast....	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.										
142. Gangrene.......................	3	..	..	..	..	..	..	..	..	..
143. Carbuncle	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
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3	3	5	9	8	8	11	7	14	6	11	6	4	1	2
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
144. Phlegmon, acute abscess........	1	..	1	..	..	..	1	..	..	..
145. Other diseases of skin and adnexa	..	..	..	..	..	..	..	..	..	..
IX.—Diseases of Locomotory System.										
146. Diseases of bones (non-tuberculous)	..	..	..	..	..	..	..	..	..	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)............	..	..	..	..	..	..	..	..	..	..
148. Amputation....................	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	..	..	..	..	..	..	..	..	..	..
X.—Malformations.										
150. Congenital malformations......	4	4	..	..	..	..	4	..	..	..
XI.—Diseases of Infancy.										
151. Congenital debility, icterus and sclerema	55	55	..	..	..	..	55	..	..	..
151a. Injury during birth............	1	1	..	..	..	..	1	..	..	..
152. Other diseases peculiar to infancy	1	1	..	..	..	..	1	..	..	..
153. Neglect.........................	1	1	..	..	..	..	1	..	..	..
XII.—Diseases of Old Age.										
154. Senile debility..................	26	..	..	..	..	..	..	..	..	..
XIII.—External Causes.										
155. Suicide by poison...............	6	..	..	..	..	..	..	..	..	..
156. Suicide by asphyxia............	2	..	..	..	..	..	..	..	..	..
157. Suicide by hanging and strangulation................	1	..	..	..	..	..	..	..	..	..
158. Suicide by drowning............	..	..	..	..	..	..	..	..	..	..
159. Suicide by firearms.............	1	..	..	..	..	..	..	..	..	1
160. Suicide by cutting instruments.	..	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height......................	..	..	..	..	..	..	..	..	..	..
162. Suicide by crushing.............	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods.......	..	..	..	..	..	..	..	..	..	..
164. Fractures......................	..	..	..	..	..	..	..	..	..	..
165. Dislocations....................	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries.......	7	..	1	..	..	..	1	3	..	..
167. Burn, by fire, scald	16	1	..	1	2	2	6	6	1	1
168. Burning by corrosive substances	..	..	..	..	..	..	..	..	..	..
169. Sunstroke......................	2	..	..	..	..	..	..	..	..	..
170. Freezing.......................	..	..	..	..	..	..	..	..	..	..
171. Electrical shock................	..	..	..	..	..	..	..	..	..	..
172. Accidental drowning............	..	..	..	..	..	..	..	..	..	..
173. Inanition (starvation)	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
174. Inhalation of noxious gas, not suicidal	..	..	..	..	..	..	..	..	..	..
175. Other acute poisoning	..	..	..	..	..	..	..	..	..	..
176. Other external violence	3	..	1	1	..	..	2	..	..	..
(Of which) a. Homicide, by blows..	..	..	..	..	..	..	..	..	..	..
b. Homicide, by sharp instruments	..	..	..	..	..	..	..	..	..	..
c. Homicide, by gunshot	..	..	..	..	..	..	..	..	..	..
d. Homicide, by poison.	..	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods	..	..	..	..	..	..	..	..	..	..
XIV.—Ill-defined or Not Specified Causes.										
177. Dropsy	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes	21	14	5	2	..	..	21	..	..	..
I.—General diseases	328	23	14	12	10	11	70	23	8	20
a. Tuberculous diseases	135	4	5	2	..	..	11	1	3	15
b. Cancer	60	..	..	..	..	..	..	..	..	..
II.—Diseases of nervous system and organs of sense	165	26	9	6	3	1	45	9	6	2
III.—Diseases of circulatory system	160	2	..	1	1	..	4	6	8	4
IV.—Diseases of respiratory system	210	59	20	7	3	3	92	5	1	2
V.—Diseases of digestive system.	220	127	21	6	3	2	159	1	1	1
VI.—Diseases of genito-urinary system	126	..	..	..	3	..	3	2	2	4
VII.—Puerperal diseases	37	..	..	..	..	..	..	..	..	2
VIII.—Diseases of skin and cellular tissue	4	..	1	..	..	..	1	..	..	..
IX.—Diseases of locomotory system	..	..	..	..	..	..	..	..	..	..
X.—Malformations	4	4	..	..	..	..	4	..	..	..
XI.—Diseases of infancy	58	58	..	..	..	..	58	..	..	..
XII.—Diseases of old age	26	..	..	..	..	..	..	..	..	..
XIII.—External causes	38	1	2	2	2	2	9	9	1	2
a. Suicide	10	..	..	..	..	..	..	..	..	1
b. Homicide	..	..	..	..	..	..	..	..	..	..
c. Accident	28	1	2	2	2	2	9	9	1	1
XIV.—Causes ill defined	21	14	5	2	..	..	21	..	..	..
Total females	1,397	314	72	36	25	19	466	55	27	37

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
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20	28	28	22	14	15	15	16	18	10	11	4	3	3	14
18	25	20	16	6	7	3	5	4	..	..	..	1	..	8
..	1	1	4	5	6	11	10	7	6	6	2	1	..	..
3	1	3	6	5	9	14	8	11	17	8	8	5	5	7
6	5	2	7	7	11	8	12	18	20	14	10	11	7	4
4	5	5	9	7	8	11	9	9	11	11	7	13	1	9
3	4	3	5	7	4	5	6	2	6	5	4	2	2	3
4	4	8	13	11	8	12	9	14	8	12	7	4	1	2
4	12	8	9	2	..	..	..	..	..	..	..	..	..	..
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48	62	58	72	56	55	67	62	72	77	62	46	46	29	42

BOROUGH OF

Deaths of Males by Age, and Cause of Death,

Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.											
1. Typhoid fever	11	8	..	..	..	..	..	..	..	..	1
2. Typhus fever	..	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever	..	..	..	..	..	..	..	..	..	..	..
4. Malarial fever	1	1	..	..	..	..	..	..	..	..	..
5. Small-pox	..	..	..	..	..	..	..	..	..	..	..
6. Measles	2	1	..	1	..	..	..	1	..	..	..
7. Scarlet fever	5	4	..	..	..	1	1	2	1	1	..
8. Whooping cough	9	6	5	..	1	..	..	6	..	..	..
9. Diphtheria and croup	18	10	1	1	1	2	2	7	1	1	1
10. Influenza	8	2	..	..	..	..	..	..	..	..	..
11. Miliary fever	..	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..	..
14. Dysentery	2	..	..	..	..	..	..	..	..	..	..
15. Plague	..	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	1	1	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..	..
18. Erysipelas	1	..	..	..	..	..	..	..	..	..	..
19. Other epidemic diseases	..	..	..	..	..	..	..	..	..	..	..
20. Pyæmia, septicæmia	2	2	..	..	..	..	..	..	..	..	..
21. Glanders	..	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule	..	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia	..	..	..	..	..	..	..	..	..	..	..
24. Antinomycosis	..	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	1	1	..	..	..	..	..	..	..	..	..
27. Tuberculosis of lungs	159	114	..	..	..	1	..	1	1	..	4
28. Tubercular meningitis	11	6	1	..	1	1	..	3	2	1	..
29. Abdominal tuberculosis	2	2	1	1	..	..	..	2	..	..	..
30. Potts' disease	5	4	..	..	1	..	1	2	..	..	..
31. Cold abscess	..	..	..	..	..	..	..	..	..	..	..
32. White swelling	..	..	..	..	..	..	..	..	..	..	..
33. Tuberculosis of other organs	2	1	..	..	..	..	..	..	..	..	..

RICHMOND.

for Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
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Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
34. General tuberculosis...	..	..	..	..	..	..	..	..	..	..	..
35. Scrofula...............	..	..	..	..	..	..	..	..	..	..	..
36. Syphilis...............	2	2	1	..	1	..	..	2	..	..	..
37. Gonorrhœa (adults)...	..	..	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children).	..	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	..	..	..	..	..	..	..	..	..	..	..
40. Cancer of stomach, liver...............	7	1	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum............	13	5	..	..	..	..	..	..	..	..	..
42. Cancer of female genital organs.....	8	..	..	..	..	..	..	..	..	..	..
43. Cancer of the breast...	3	..	..	..	..	..	..	..	..	..	..
44. Cancer of the skin.....	3	2	..	..	..	..	..	..	..	..	..
45. Cancer of other organs and unspecified................	10	7	..	..	..	..	..	..	..	..	..
46. Other tumors (except of female genital organs.............	..	..	..	..	..	..	..	..	..	..	..
47. Acute articular rheumatism	3	2	..	..	..	..	..	..	..	..	..
48. Chronic rheumatism and gout..........	..	..	..	..	..	..	..	..	..	..	..
49. Scurvy.................	1	1	1	..	..	..	..	1	..	..	..
50. Diabetes..............	14	8	..	..	..	..	..	..	..	..	..
51. Exophthalmic goitre..	1	1	..	..	..	..	..	..	..	..	..
52. Addison's disease......	1	..	..	..	..	..	..	..	..	..	..
53. Leukæmia............	2	2	..	..	..	..	..	..	..	..	..
54. Anæmia, chlorosis.....	4	3	..	..	..	..	..	..	..	..	..
55. Other general diseases.	1	..	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic........	11	8	..	..	..	..	..	..	1	..	..
57. Lead poisoning........	1	1	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation.	..	..	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings................	1	1	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.											
60. Encephalitis...........	..	..	..	..	..	..	..	..	..	..	..
61. Simple meningitis.....	21	13	2	1	1	..	1	5	3	1	..
61a. (Of which) cerebrospinal meningitis	12	7	1	1	..	..	1	3	2	1	..
62. Locomotor ataxia.....	1	1	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord	6	4	1	..	..	..	..	1	..	..	..
64. Apoplexy, congestion of brain............	85	46	..	..	..	..	..	..	..	..	..
65. Softening of brain.....	2	..	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified...	8	5	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
67. General paresis........	4	3	..	..	..	..	..	..	..	..	..
68. Other forms of insanity	3	..	..	..	..	..	..	..	..	..	..
69. Epilepsy...............	6	5	..	..	..	..	..	..	..	..	..
70. Convulsions (not puerperal............	..	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants	1	..	..	..	..	..	..	..	..	..	..
72. Tetanus, trismus.......	1	1	..	..	..	..	..	..	1	..	..
73. Chorea.................	..	..	..	..	..	..	..	..	..	..	..
74. Other nervous diseases	7	2	..	1	..	..	..	1	..	..	..
75. Diseases of the eyes...	1	1	..	..	..	..	..	..	..	..	..
76. Diseases of the ears...	1	1	..	..	..	..	..	..	..	..	..
III.—Diseases of Circulatory System.											
77. Pericarditis............	2	2	..	..	..	..	..	..	..	..	1
78. Acute endocarditis.....	9	6	..	..	..	..	..	..	1	..	..
79. Organic heart diseases.	99	67	..	..	..	..	..	..	..	1	..
80. Angina pectoris........	5	3	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc......	10	10	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis	6	3	..	..	..	..	..	..	..	..	..
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	..	..	..	..	..	..	..	..	..	..	..
84. Diseasesof lymphatics (lymphangitis, etc.)	..	..	..	..	..	..	..	..	..	..	..
85. Hæmorrhage..........	1	..	..	..	..	..	..	..	..	..	..
86. Other diseases of circulatory system...	..	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.											
87. Diseases of nasal fossæ	..	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx.	1	1	..	..	..	..	..	..	1	..	..
89. Diseases of thyroid gland..............	..	..	..	..	..	..	..	..	..	..	..
90. Acute bronchitis.......	14	7	5	..	..	..	..	5	..	..	..
91. Chronic bronchitis.....	7	4	1	..	..	..	..	1	..	..	..
92. Broncho-pneumonia...	33	20	10	3	..	..	..	13	..	..	..
93. Pneumonia............	128	78	4	4	2	..	3	13	..	1	1
94. Pleurisy...............	4	3	..	1	..	..	..	1	..	..	..
95. Congestion of lungs, pulmonary apoplexy	3	1	..	..	..	..	..	..	..	..	..
96. Gangrene of lung......	..	..	..	..	..	..	..	..	..	..	..
97. Asthma................	..	..	..	..	..	..	..	..	..	..	..
98. Pulmonary emphysema	1	1	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisis excepted)	1	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
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Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
V.—Diseases of Digestive System.											
100. Diseases of mouth and adnexa........	..	..	..	..	..	..	..	..	..	..	..
101. Diseases of pharynx..	1	1	1	..	..	..	..	1	..	..	..
102. Diseases of œsophagus	1	1	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach.....	5	5	..	..	..	..	..	..	..	..	..
104. Other diseases of stomach (cancer excepted)..........	12	5	1	..	..	..	..	1	1	..	..
105. Diarrhœa and enteritis (under two years)	156	85	66	19	..	..	..	85	..	..	..
(of which) chronic diarrhœa....	..	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over)	15	6	..	..	1	..	..	1	..	..	..
107. Intestinal parasites...	..	..	..	..	..	..	..	..	..	..	..
108. Hernia, intestinal obstruction........	8	5	2	..	..	..	..	2	..	1	..
109. Other diseases of intestines............	..	..	..	..	..	..	..	..	..	..	..
110. Acute yellow atrophy of liver	..	..	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver	..	..	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver......	20	14	..	..	..	..	..	..	..	..	..
113. Biliary calculi	1	..	..	..	..	..	..	..	..	..	..
114. Other diseases of liver	6	1	..	..	..	..	..	..	..	..	..
115. Diseases of spleen....	..	..	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal)....	1	..	..	..	..	..	..	..	..	..	..
117. Other diseases of digestive system (except tuberculosis and cancer)........	..	..	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess.......	10	6	..	..	..	..	..	..	..	..	..
VI.—Diseases of Genito-urinary System.											
119. Acute nephritis.......	9	3	..	..	..	..	..	..	..	..	..
120. Bright's disease.......	90	59	..	..	..	..	..	..	..	..	..
121. Other diseases of kidneys and adnexa	1	..	..	..	..	..	..	..	..	..	..
122. Urinary calculus......	..	..	..	..	..	..	..	..	..	..	..
123. Diseases of bladder...	5	4	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc.	2	2	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate...............	..	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs	..	..	..	..	..	..	..	..	..	..	..
127. Metritis...............	..	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (not puerperal)....	..	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer)	..	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus	..	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
131. Ovarian cysts and tumors	..	..	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs	..	..	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal, nor cancer)	..	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.											
134. Accidents of pregnancy	4	..	..	..	..	..	..	..	..	..	..
135. Puerperal hæmorrhage	..	..	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	2	..	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia.	4	..	..	..	..	.	..	..	..	..	..
138. Puerperal albuminuria and convulsions	8	..	..	..	..	..	..	..	..	..	..
139. Puerperal phlegmasia alba dolens	..	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death	..	..	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast	..	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.											
142. Gangrene	2	1	..	..	..	..	..	..	..	..	..
143. Carbuncle	..	..	..	..	..	..	..	..	..	..	..
144. Phlegmon, acute abscess	2	2	..	..	1	..	..	1	..	..	..
145. Other diseases of skin and adnexa	1	1	..	..	..	..	..	..	..	..	..
IX.—Diseases of Locomotory System.											
146. Diseases of bones (non-tuberculous)	4	4	..	..	..	..	..	..	..	..	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)	..	..	..	..	..	..	..	..	..	..	..
148. Amputation	..	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion	..	..	..	..	..	..	..	..	..	..	..
X.—Malformations.											
150. Congenital malformations	13	10	10	..	..	..	..	10	..	..	..
XI.—Diseases of Infancy.											
151. Congenital debility, icterus and sclerema	78	49	49	..	..	..	..	49	..	..	..
151a. Injury during birth	1	1	1	..	..	..	..	1	..	..	..
152. Other diseases peculiar to infancy	2	2	2	..	..	..	..	2	..	..	..
153. Neglect	4	2	2	..	..	..	..	2	..	..	..
XII.—Diseases of Old Age.											
154. Senile debility	25	16	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
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Cause of Death.	Total both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
XIII.—External Causes.											
155. Suicide by poison....	3	2	..	..	..	..	..	..	..	..	..
156. Suicide by asphyxia..	..	..	..	..	..	..	..	..	..	..	..
157. Suicide by hanging or strangulation...	1	1	..	..	..	..	..	2	..	..	..
158. Suicide by drowning..	..	..	..	..	..	..	..	..	..	..	..
159. Suicide by firearms...	2	1	..	..	..	..	..	..	..	..	..
160. Suicide by cutting instruments	..	..	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height...	..	..	..	..	..	..	..	..	..	..	..
162. Suicide by crushing...	..	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods...........	..	..	..	..	..	..	..	..	..	..	..
164. Fractures.............	10	5	..	..	..	..	1	1	1	..	..
165. Dislocations..........	..	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries..............	16	14	..	..	..	..	..	..	1	..	1
167. Burn, by fire, scald...	11	5	1	1	..	..	..	2	..	..	1
168. Burning by corrosive substances.........	..	..	..	..	..	..	..	..	..	..	..
169. Sunstroke.............	7	4	..	1	..	..	..	1	..	..	1
170. Freezing..............	2	1	..	..	..	..	..	..	..	..	..
171. Electrical shock	2	2	..	..	..	..	..	..	..	..	..
172. Accidental drowning..	27	23	..	..	..	..	1	1	2	1	1
173. Inanition (starvation).	..	..	..	..	..	..	..	..	..	..	..
174. Inhalation of noxious gas, not suicidal ...	4	3	..	..	..	..	..	..	..	..	..
175. Other acute poisoning.	1	1	..	..	..	..	1	1	..	..	..
176. Other external violence...............	4	4	1	..	..	..	..	1	..	..	..
(of which)											
a. Homicide, by blows.	1	1	..	..	..	..	..	..	..	..	..
b. Homicide, by sharp instruments	1	1	..	..	..	..	..	..	..	..	..
c. Homicide, by gunshot............	1	1	..	..	..	..	..	..	..	..	..
d. Homicide, by poison	..	..	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods.......	..	..	..	..	..	..	..	..	..	..	..
XIV.—Ill-defined or Not Specified Causes.											
177. Dropsy................	..	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal..........	..	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes.....	10	5	4	..	..	..	..	4	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and Over.	Colored.	Chinese.
..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..
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Cause of Death.	Total Both Sexes.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General diseases...	326	207	10	3	5	5	4	27	6	3	6
a. Tuberculous diseases	180	128	2	1	2	2	1	8	3	1	4
b. Cancer	44	15	..	..	..	..	..	..	..	..	..
II.—Diseases of nervous system and organs of sense	147	82	3	2	1	..	1	7	4	1	..
III.—Diseases of circulatory system..	132	91	..	..	..	..	..	..	1	1	1
IV.—Diseases of respiratory system...	192	115	20	8	2	..	3	33	1	1	1
V.—Diseases of digestive system.	236	129	70	19	1	..	..	90	1	1	..
VI.—Diseases of genito-urinary system.	107	68	..	..	..	..	..	..	..	..	..
VII.—Puerperal diseases.	18	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of skin and cellular tissue	5	4	..	..	1	..	..	1	..	..	..
IX.—Diseases of locomotory system.	4	4	..	..	..	..	..	..	..	..	..
X.—Malformations.....	13	10	10	..	..	..	..	10	..	..	..
XI.—Diseases of infancy	85	54	54	..	..	..	..	54	..	..	..
XII.—Diseases of old age	25	16	..	..	..	..	..	..	..	..	..
XIII.—External causes....	90	66	2	2	..	..	3	7	4	1	4
a. Suicide	6	4	..	..	..	..	..	..	..	..	..
b. Homicide..........	3	3	..	..	..	..	..	..	..	..	..
c. Accident...........	81	59	2	2	..	..	3	7	4	1	4
XIV.—Causes ill-defined..	9	5	4	..	..	..	..	4	..	..	..
Total males.....	..	851	173	34	10	5	11	233	17	8	12
Total females...	..	538	121	20	5	6	7	159	10	7	13
Total both sexes.	..	1,389	294	54	15	11	18	392	27	15	25

Deaths of Females by Age, and Cause of Death,

Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
I.—General Diseases.										
1. Typhoid fever....................	3	..	..	..	..	..	..	..	..	1
2. Typhus fever....................	..	..	..	..	..	..	..	..	..	..
3. Relapsing fever..................	..	..	..	..	..	..	..	..	..	..
4. Malarial fever....................	..	..	..	..	..	..	..	..	..	..
5. Small-pox	..	..	..	..	..	..	..	..	..	..
6. Measles..........................	1	..	1	..	..	..	1	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.	Chinese.
16	18	20	21	20	22	18	11	4	4	3	5	3	..	4	..
12	10	18	16	14	14	12	7	3	1	2	2	1	..	2	..
..	..	..	1	3	1	3	2	1	1	..	1	2	..	..	..
1	1	3	4	4	9	5	4	6	9	9	11	3	1	1	..
..	3	4	1	8	4	4	4	8	11	13	17	6	5	1	..
3	6	2	7	1	5	7	3	14	4	12	8	3	4	3	..
1	4	1	1	3	3	6	5	5	3	3	1	1	..	2	..
2	..	3	2	8	5	4	7	5	13	11	3	3	2	2	..
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28	38	41	42	51	57	49	37	44	50	58	50	22	14	18	..
14	21	25	30	26	21	29	19	26	34	44	24	25	11	11	..
42	59	66	72	77	78	78	56	70	84	102	74	47	25	29	..

for Year Ending December 31, 1905.

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
7. Scarlet fever	1	1	..	..	..	..	1	..	..	..
8. Whooping cough	3	3	..	..	..	..	3	..	..	..
9. Diphtheria and croup	8	..	..	2	..	3	5	2	..	..
10. Influenza	6	2	..	1	1	..	4	..	..	..
11. Miliary fever	..	..	..	..	..	..	..	..	..	..
12. Asiatic cholera	..	..	..	..	..	..	..	..	..	..
13. Cholera nostras	..	..	..	..	..	..	..	..	..	..
14. Dysentery	2	1	..	..	..	..	1	1	..	..
15. Plague	..	..	..	..	..	..	..	..	..	..
16. Yellow fever	..	..	..	..	..	..	..	..	..	..
17. Leprosy	..	..	..	..	..	..	..	..	..	..
18. Erysipelas	1	..	..	..	..	..	..	..	..	..
19. Other epidemic diseases	..	..	..	..	..	..	..	..	..	..
20. Pyæmia septicæmia	..	..	..	..	..	..	..	..	..	..
21. Glanders	..	..	..	..	..	..	..	..	..	..
22. Malignant pustule	..	..	..	..	..	..	..	..	..	..
23. Hydrophobia	..	..	..	..	..	..	..	..	..	..
24. Actinomycosis	..	..	..	..	..	..	..	..	..	..
24a. Trichinosis	..	..	..	..	..	..	..	..	..	..
25. Pellagra	..	..	..	..	..	..	..	..	..	..
26. Tuberculosis of larynx	..	..	..	..	..	..	..	..	..	..
27. Tuberculosis of lungs	45	..	..	..	..	..	..	2	..	4
28. Tubercular meningitis	5	3	2	..	..	..	5	..	..	..
29. Abdominal tuberculosis	..	..	..	..	..	..	..	..	..	..
30. Potts' disease	1	..	..	..	..	..	..	..	1	..
31. Cold abscess	..	..	..	..	..	..	..	..	..	..
32. White swelling	..	..	..	..	..	..	..	..	..	..
33. Tuberculosis of other organs	1	..	..	1	..	..	1	..	..	..
34. General tuberculosis	..	..	..	..	..	..	..	..	..	..
35. Scrofula	..	..	..	..	..	..	..	..	..	..
36. Syphilis	..	..	..	..	..	..	..	..	..	..
37. Gonorrhœa (adults)	..	..	..	..	..	..	..	..	..	..
38. Gonorrhœa (children)	..	..	..	..	..	..	..	..	..	..
39. Cancers, etc., of the mouth	..	..	..	..	..	..	..	..	..	..
40. Cancer of stomach, liver	6	..	..	..	..	..	..	..	..	..
41. Cancer of intestines, rectum	8	..	..	..	..	..	..	..	..	..
42. Cancer of female genital organs.	8	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
43. Cancer of the breast	3	..	..	..	..	..	..	..	..	..
44. Cancer of the skin	1	..	..	..	..	..	..	..	..	..
45. Cancer of other organs and unspecified	3	..	..	..	..	..	..	..	..	..
46. Other tumors (except of female genital organs)	..	..	..	..	..	..	..	..	..	..
47. Acute articular rheumatism	1	..	..	..	..	..	..	..	..	1
48. Chronic rheumatism and gout	..	..	..	..	..	..	..	..	..	..
49. Scurvy	..	..	..	..	..	..	..	..	..	..
50. Diabetes	6	..	..	..	..	..	..	..	3	..
51. Exophthalmic goitre	..	..	..	..	..	..	..	.	..	..
52. Addison's disease	1	..	..	..	..	..	..	..	..	..
53. Leukæmia	..	..	..	..	..	..	..	..	..	..
54. Anæmia, chlorosis	1	..	..	..	..	..	..	..	..	..
55. Other general diseases	1	..	..	..	..	..	..	..	..	..
56. Alcoholism, acute and chronic	3	..	..	..	..	..	..	..	..	..
57. Lead poisoning	..	..	..	..	..	..	..	..	..	..
58. Other chronic poisonings of occupation	..	..	..	..	..	..	..	..	..	..
59. Other chronic poisonings	..	..	..	..	..	..	..	..	..	..
II.—Diseases of Nervous System and Organs of Sense.										
60. Encephalitis	..	..	..	..	..	..	..	..	..	..
61. Simple meningitis	8	..	2	..	..	..	2	1	..	..
61a. (of which) cerebro-spinal meningitis	5	..	1	..	..	..	1	..	..	..
62. Locomotor ataxia	..	..	..	..	..	..	..	..	..	..
63. Other diseases of spinal cord	2	..	..	..	..	..	..	..	1	..
64. Apoplexy, congestion of brain	39	..	..	..	..	..	..	..	..	..
65. Softening of brain	2	..	..	..	..	..	..	..	..	..
66. Paralysis unspecified	3	..	..	..	..	1	1	..	..	..
67. General paresis	1	..	..	..	..	..	..	..	..	..
68. Other forms of insanity	3	..	..	..	..	..	..	..	..	..
69. Epilepsy	1	..	..	..	..	..	..	..	..	..
70. Convulsions (not puerperal)	..	..	..	..	..	..	..	..	..	..
71. Convulsions of infants	1	1	..	..	..	..	1	..	..	..
72. Tetanus, trismus	..	..	..	..	..	..	..	..	..	..
73. Chorea	..	..	..	..	..	..	..	..	..	..
74. Other nervous diseases	5	..	..	..	..	..	..	..	..	1
75. Diseases of the eyes	..	..	..	..	..	..	..	..	..	..
76. Diseases of the ears	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85	Colored.
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
III.—Diseases of Circulatory System.										
77. Pericarditis	..	..	..	..	..	..	..	..	..	..
78. Acute endocarditis	3	..	..	..	..	..	..	1	..	..
79. Organic heart diseases	32	..	..	..	..	..	..	..	..	..
80. Angina pectoris	2	..	..	..	..	..	..	..	..	..
81. Diseases of arteries, aneurism, etc	..	..	..	..	..	..	..	..	..	..
82. Embolism, thrombosis	3	..	..	..	..	..	..	..	..	..
83. Diseases of veins (hæmorrhoids, varices, phlebitis, etc.)	..	..	..	..	..	..	..	..	..	..
84. Diseases of lymphatics (lymphangitis, etc.)	..	..	..	..	..	..	..	..	..	..
85. Hæmorrhage	1	..	..	..	..	..	..	..	..	..
86. Other diseases of circulatory system	..	..	..	..	..	..	..	..	..	..
IV.—Diseases of Respiratory System.										
87. Diseases of the nasal fossæ	..	..	..	..	..	..	..	..	..	..
88. Diseases of the larynx	..	..	..	..	..	..	..	..	..	..
89. Diseases of thyroid gland	..	..	..	..	..	..	..	..	..	..
90. Acute bronchitis	7	3	..	..	..	1	4	..	..	..
91. Chronic bronchitis	3	..	..	..	..	..	..	..	..	..
92. Broncho-pneumonia	13	4	1	..	1	..	6	..	..	..
93. Pneumonia	50	3	2	1	..	..	6	..	..	1
94. Pleurisy	1	..	..	..	..	..	..	..	..	..
95. Congestion of lungs, pulmonary apoplexy	2	..	..	..	..	..	..	..	..	..
96. Gangrene of lung	..	..	..	..	..	..	..	..	..	..
97. Asthma	..	..	..	..	..	..	..	..	..	..
98. Pulmonary emphysema	..	..	..	..	..	..	..	..	..	..
99. Other diseases of respiratory system (phthisis excepted) ..	1	..	..	..	..	..	..	..	..	..
V.—Diseases of Digestive System.										
100. Diseases of mouth and adnexa..	..	..	..	..	..	..	..	..	..	..
101. Diseases of pharynx	..	..	..	..	..	..	..	..	..	..
102. Diseases of œsophagus	..	..	..	..	..	..	..	..	..	..
103. Ulcer of stomach	..	..	..	..	..	..	..	..	..	..
104. Other diseases of stomach (cancer excepted)	7	1	..	..	1	..	2	..	..	..
105. Diarrhœa and enteritis (under two years)	71	61	10	..	..	..	71	..	..	..
(of which) chronic diarrhœa...	..	..	..	..	..	..	..	..	..	..
106. Diarrhœa and enteritis (two years and over)	9	..	..	..	..	1	1	..	..	..
107. Intestinal parasites	..	..	..	..	..	..	..	..	..	..
108. Hernia, intestinal obstruction ..	3	..	..	..	..	..	..	..	1	..
109. Other diseases of intestines	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
110. Acute yellow atrophy of liver...	..	..	..	..	..	..	..	..	..	..
111. Hydatid tumor of liver.........	..	..	..	..	..	..	..	..	..	..
112. Cirrhosis of liver...............	6	1	..	..	..	..	1	..	..	..
113. Biliary calculi	1	..	..	..	..	..	..	..	..	..
114. Other diseases of liver..	5	..	..	..	..	..	..	..	..	..
115. Diseases of spleen..............	..	..	..	..	..	..	..	..	..	..
116. Simple peritonitis (non-puerperal)	1	..	..	..	..	..	..	..	..	..
117. Other diseases of digestive system (except tuberculosis and cancer).................	..	..	..	..	..	..	..	..	..	..
118. Appendicitis and iliac abscess..	4	..	..	..	..	..	..	2	..	1
VI.—Diseases of Genito-urinary System.										
119. Acute nephritis.................	6	1	..	..	..	..	1	1	1	..
120. Bright's disease.................	31	..	..	..	..	..	..	..	..	..
121. Other diseases of kidneys and adnexa......................	1	..	..	..	..	..	..	..	..	..
122. Urinary calculus	..	..	..	..	..	..	..	..	..	..
123. Diseases of bladder.............	1	..	..	..	..	..	..	..	..	..
124. Diseases of urethra, urinary abscess, etc	..	..	..	..	..	..	..	..	..	..
125. Diseases of the prostate........	..	..	..	..	..	..	..	..	..	..
126. Non-venereal diseases of male genital organs..............	..	..	..	..	..	..	..	..	..	..
127. Metritis	..	..	..	..	..	..	..	..	..	..
128. Uterine hæmorrhage (non-puerperal)	..	..	..	..	..	..	..	..	..	..
129. Uterine tumor (not cancer).....	..	..	..	..	..	..	..	..	..	..
130. Other diseases of uterus........	..	..	..	..	..	..	..	..	..	..
131. Ovarian cysts and tumors.......	..	..	..	..	..	..	..	..	..	..
132. Other diseases of female genital organs...................	..	..	..	..	..	..	..	..	..	..
133. Diseases of breast (not puerperal, nor cancer)...........	..	..	..	..	..	..	..	..	..	..
VII.—Puerperal Diseases.										
134. Accidents of pregnancy.........	4	..	..	..	..	..	..	..	..	..
135. Puerperal hæmorrhage.........	..	..	..	..	..	..	..	..	..	..
136. Other accidents of labor	2	..	..	..	..	..	..	..	..	..
137. Puerperal septicæmia...........	4	..	..	..	..	..	..	..	..	..
138. Puerperal albuminuria and convulsions................	8	..	..	..	..	..	..	..	..	1
139. Puerperal phlegmasia alba dolens	..	..	..	..	..	..	..	..	..	..
140. Other accidents of parturition, sudden death...............	..	..	..	..	..	..	..	..	..	..
141. Puerperal diseases of breast....	..	..	..	..	..	..	..	..	..	..
VIII.—Diseases of Skin and Cellular Tissue.										
142. Gangrene.......................	1	..	..	..	..	..	..	..	..	..
143. Carbuncle	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
144. Phlegmon, acute abscess........	..	..	..	..	..	..	..	..	..	..
145. Other diseases of skin and adnexa........................	..	..	..	..	..	..	..	..	..	..
IX.-Diseases of Locomotory System.										
146. Diseases of bones (non-tuberculous)........................	..	..	..	..	..	..	..	..	..	..
147. Arthritis, other diseases of joints (except tuberculosis and rheumatism)............	..	..	..	..	..	..	..	..	..	..
148. Amputation....................	..	..	..	..	..	..	..	..	..	..
149. Other diseases of organs of locomotion..................	..	..	..	..	..		..	..	..	..
X.—Malformations.										
150. Congenital malformations......	3	3	..	..	..	..	3	..	..	..
XI.—Diseases of Infancy.										
151. Congenital debility, icterus and sclerema................	29	29	..	..	..	..	29	..	..	..
151a. Injury during birth............	..	..	..	..	..	..	..	..	..	..
152. Other diseases peculiar to infancy........................	..	..	..	..	..	..	..	..	..	..
153. Neglect........................	2	2	..	..	..	..	2	..	..	..
XII.—Diseases of Old Age.										
154. Senile debility..................	9	..	..	..	..	..	..	..	..	..
XIII.—External Causes.										
155. Suicide by poison...............	1	..	..	..	..	..	..	..	..	1
156. Suicide by asphyxia............	..	..	..	..	..	..	..	..	..	..
157. Suicide by hanging or strangulation......................	..	..	..	..	..	..	..	..	..	..
158. Suicide by drowning............	..	..	..	..	..	..	..	..	..	..
159. Suicide by firearms.............	1	..	..	..	..	..	..	..	..	..
160. Suicide by cutting instruments..	..	..	..	..	..	..	..	..	..	..
161. Suicide by precipitation from height......................	..	..	..	..	..	..	..	..	..	..
162. Suicide by crushing.............	..	..	..	..	..	..	..	..	..	..
163. Suicide by other methods.......	..	..	..	..	..	..	..	..	..	..
164. Fractures......................	5	..	..	..	..	..	..	..	..	1
165. Dislocations....................	..	..	..	..	..	..	..	..	..	..
166. Other accidental injuries........	2	..	..	..	1	..	1	..	..	..
167. Burn, by fire, scald..............	6	..	..	..	1	1	2	..	..	..
168. Burning by corrosive substances.	..	..	..	..	..	..	..	..	..	..
169. Sunstroke.......................	3	1	..	..	..	1	..	..	..	..
170. Freezing........................	1	..	..	..	..	..	..	..	..	..
171. Electrical shock................	..	..	..	..	..	..	..	..	..	..
172. Accidental drowning............	4	..	..	..	1	..	1	..	..	1
173. Inanition (starvation)..........	..	..	..	..	..	..	..	..	..	..

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
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Cause of Death.	All Ages.	Under 1 Year.	1	2	3	4	Total Under 5.	5	10	15
174. Inhalation of noxious gas, not suicidal	1	..	..	..	..	..	..	..	..	..
175. Other acute poisoning	..	..	..	..	..	..	..	..	..	..
176. Other external violence	..	..	..	..	..	..	..	..	..	..
(Of which)										
a. Homicide, by blows	..	..	..	..	..	..	..	..	..	..
b. Homicide, by sharp instruments	..	..	..	..	..	..	..	..	..	..
c. Homicide, by gunshot	..	..	..	..	..	..	..	..	..	..
d. Homicide, by poison	..	..	..	..	..	..	..	..	..	..
e. Homicide, by other methods	..	..	..	..	..	..	..	..	..	..
XIV.—Ill-defined or Not Specified Causes.										
177. Dropsy	..	..	..	..	..	..	..	..	..	..
178. Sudden death, not puerperal	..	..	..	..	..	..	..	..	..	..
179. Ill-defined causes	4	1	2	..	..	..	3	..	..	..
I.—General diseases	119	10	3	4	1	3	21	5	4	6
a. Tuberculous diseases	52	3	2	1	..	..	6	2	1	4
b. Cancer	29	..	..	..	..	..	..	..	..	..
II.—Diseases of nervous system and organs of sense	65	1	2	..	..	1	4	1	1	1
III.—Diseases of circulatory system	41	..	..	..	..	..	..	1	..	..
IV.—Diseases of respiratory system	77	10	3	1	1	1	16	..	..	1
V.—Diseases of digestive system.	107	63	10	..	1	1	75	2	1	1
VI.—Diseases of genito-urinary system	39	1	..	..	..	..	1	1	1	..
VII.—Puerperal diseases	18	..	..	..	..	..	..	..	..	1
VIII.—Diseases of skin and cellular tissue	1	..	..	..	..	..	..	..	..	..
IX.—Diseases of locomotory system	..	..	..	..	..	..	..	..	..	..
X.—Malformations	3	3	..	..	..	..	3	..	..	..
XI.—Diseases of infancy	31	31	..	..	..	..	31	..	..	..
XII.—Diseases of old age	9	..	..	..	..	..	..	..	..	..
XIII.—External causes	24	1	..	..	3	1	5	..	..	3
a. Suicide	2	..	..	..	..	..	..	..	..	1
b. Homicide	..	..	..	..	..	..	..	..	..	..
c. Accident	22	1	..	..	3	1	5	..	..	2
XIV.—Causes ill-defined	4	1	2	..	..	..	3	..	..	..
Total females	538	121	20	5	6	7	159	10	7	13

20	25	30	35	40	45	50	55	60	65	70	75	80	85 and over.	Colored.
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
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5	8	9	13	8	7	10	7	2	5	7	1	1	..	3
5	5	5	6	3	4	5	4	..	2	..	..	..	..	3
..	2	1	4	4	3	3	2	1	2	5	1	1	..	..
2	1	1	..	2	3	4	4	8	10	8	5	8	2	1
1	1	2	..	4	1	6	2	3	5	11	1	3	..	1
..	1	3	6	2	5	4	1	2	10	10	6	8	2	1
1	1	3	2	2	2	1	2	5	..	1	4	2	2	2
..	5	4	3	3	1	3	3	4	3	3	4	..	..	..
5	3	3	3	3	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	1	2	1	1	4	1
..	1	..	3	2	2	..	..	2	..	2	2	1	1	..
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	3	2	1	..	..	2	..	2	2	1	1	..
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
14	21	25	30	26	21	29	19	26	34	44	24	25	11	11

Table of Mortality from the Principal Causes

Cause of Death.	Borough of									
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
Total, all causes	3,541	3,405	3,889	3,769	3,306	2,980	3,855	3,162	2,928	2,863
1. Typhoid fever	17	14	15	12	10	15	23	37	45	44
2. Typhus fever	..	..	..	..	..	..	..	..	..	..
3. Malarial fevers	1	..	1	..	..	3	1	4	1	..
4. Small-pox	..	..	..	..	..	..	..	1	..	..
5. Measles	13	13	25	23	34	59	34	15	9	6
6. Scarlet fever	30	30	36	26	28	17	6	2	2	4
7. Whooping cough	10	16	22	33	18	18	25	32	13	10
8. Diphtheria and croup	84	87	71	89	82	41	37	35	27	36
9. Influenza	38	25	17	7	7	3	..	..	2	1
10. Asiatic cholera	..	..	..	..	..	..	..	..	..	..
11. Cholera nostras	..	..	..	..	..	..	..	..	..	..
12. Other epidemic diseases	20	19	16	29	36	23	12	13	11	7
13. Tuberculosis pulmonalis	352	352	435	405	376	336	317	308	324	324
14. Tubercular meningitis	40	36	35	36	43	31	37	24	30	33
15. Other forms of tuberculosis	14	17	18	17	20	21	22	23	13	19
16. Cancer, malignant tumors	128	122	149	159	129	134	140	132	121	147
17. Meningitis, simple	144	179	311	324	255	123	89	58	57	53
Of which										
17a. Cerebro spinal meningitis	95	140	269	300	238	114	67	43	36	34
18. Apoplexy, congestion and softening of brain	126	110	122	132	95	108	96	70	98	96
19. Organic heart disease	228	280	247	255	234	195	192	180	211	223
20. Acute bronchitis	94	88	104	102	73	61	45	43	31	49
21. Chronic bronchitis	14	12	13	11	4	1	3	2	5	4
22. Pneumonia (excluding broncho-pneumonia)	374	329	322	299	232	124	90	92	97	172
22a. Broncho-pneumonia	353	294	339	344	276	223	188	151	117	154
23. Diseases of stomach (cancer excepted)	21	18	16	19	14	22	20	21	18	15
24. Diarrhœas (under five years)	98	84	112	101	107	215	1,003	682	442	245
25. Hernia, intestinal obstruction	38	20	38	30	27	22	23	30	23	27
26. Cirrhosis of liver	40	37	43	30	39	32	37	50	49	32
27. Bright's disease and nephritis	298	279	320	280	244	255	245	228	223	274
Diseases of women (not cancer)	23	24	22	27	16	16	15	20	14	12
29. Puerperal septicæmia	23	17	16	18	16	15	7	5	10	6

of Death During the Year 1905.

Manhattan.			Borough of The Bronx.												
Nov.	Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2,843	3,130	39,671	517	413	535	453	488	403	564	454	425	402	414	460	5,528
21	20	273	2	1	2	3	1	1	2	6	4	..	7	8	37
..	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..
2	1	14	..	..	..	..	..	..	4	..	1	..	..	..	5
..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
11	15	257	4	..	11	8	8	6	6	5	1	1	4	3	57
8	11	200	12	12	15	10	7	5	1	..	1	6	2	..	71
2	9	208	..	2	3	5	8	1	4	2	2	3	1	..	31
30	41	660	16	8	8	11	13	24	25	15	16	10	17	37	200
7	9	116	12	5	3	1	1	..	1	..	..	..	..	1	24
..	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..
19	17	222	1	2	2	1	3	1	3	7	1	1	..	2	24
340	368	4,237	133	97	145	126	126	113	110	108	116	120	125	122	1,441
17	29	391	5	4	2	4	6	1	2	4	4	2	4	..	42
15	9	206	4	3	6	1	1	2	1	2	3	2	2	4	31
144	144	1,649	17	10	16	10	14	16	17	11	20	17	22	15	185
47	69	1,709	4	8	24	21	20	7	10	9	7	9	2	6	127
34	53	1,023	4	1	22	19	16	6	5	5	3	1	2	3	87
102	131	1,286	27	26	18	18	18	16	16	12	15	9	18	29	222
227	258	2,730	14	35	27	32	34	20	21	27	32	34	40	26	342
66	65	821	10	5	6	3	1	1	..	..	4	3	3	7	43
6	3	78	5	2	1	3	4	2	4	2	2	1	1	3	30
285	317	2,733	57	43	55	37	30	17	11	10	19	6	33	46	364
196	254	2,889	20	18	21	21	15	11	10	8	4	8	9	8	153
13	12	209	7	..	3	4	4	3	2	3	1	5	4	6	42
69	80	3,238	8	11	9	2	4	24	113	74	29	25	1	11	311
20	25	323	2	2	3	1	1	2	6	7	2	1	2	2	31
32	62	483	6	1	8	3	1	4	4	1	4	2	5	3	42
287	271	3,204	36	26	49	30	38	29	35	30	26	34	33	24	390
12	11	212	..	1	3	..	..	1	2	..	2	1	..	2	12
3	15	151	4	3	7	5	4	1	2	2	3	..	4	3	38

Cause of Death.	Borough of									
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
30. Other puerperal diseases	9	24	24	25	22	13	29	24	22	28
31. Congenital debility and malformations	217	192	211	222	227	208	262	219	211	225
32. Old age	21	23	27	22	20	13	19	16	18	16
33. Violent deaths	179	176	224	208	211	204	339	188	227	206
a. Sunstroke	..	..	..	..	..	4	126	4	..	..
b. Other accidents	137	139	180	165	162	161	184	154	191	169
c. Homicide	8	11	5	6	8	4	6	8	10	10
d. Suicide	34	26	39	37	41	35	23	22	26	27
34. All other causes	465	454	504	433	378	389	404	359	388	341
35. Ill-defined causes	29	34	34	51	33	40	95	98	69	56
Under one year	711	658	757	809	707	711	1,443	1,037	814	658
One year and under two years	205	187	267	240	236	200	308	247	177	142
Total under five years	1,129	1,061	1,247	1,275	1,174	1,071	1,913	1,419	1,101	904
Sixty-five years and over	519	483	526	439	390	350	378	309	316	373
Seventy years and over	336	304	351	311	253	226	254	191	205	228
Males	1,993	1,901	2,077	2,102	1,793	1,602	2,157	1,741	1,559	1,536
Females	1,548	1,504	1,812	1,667	1,513	1,378	1,698	1,421	1,369	1,327
Colored	96	76	75	91	84	103	115	109	88	99
Chinese	4	8	4	3	2	9	7	8	6	6

Manhattan.			Borough of The Bronx.												
Nov.	Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
28	26	274	3	..	5	..	1	2	1	4	1	3	1	1	22
199	213	2,606	15	19	15	20	30	23	29	20	22	24	15	19	251
18	31	244	4	3	5	4	5	3	6	2	5	2	1	3	43
220	213	2,595	35	15	18	26	29	29	51	34	31	28	26	25	347
..	..	134	..	..	..	..	..	..	..	..	..	..	..	..	..
179	170	1,991	31	12	14	19	24	26	48	31	23	25	22	17	292
4	11	91	2	1	..	..	2	1	1	1	2	..	..	2	12
37	32	379	2	2	4	7	3	2	2	2	6	3	4	6	43
362	375	4,852	51	50	42	40	60	33	56	33	36	38	31	38	508
35	26	600	3	1	3	3	1	5	9	16	11	5	3	2	62
523	573	9,401	60	63	69	65	70	64	160	123	82	69	35	57	917
100	145	2,454	29	15	21	27	27	19	29	27	23	20	11	12	260
714	851	13,862	121	95	115	110	117	103	215	171	121	103	59	95	1,425
444	495	5,022	80	65	78	64	59	50	76	43	44	57	57	78	751
284	310	3,253	61	45	61	42	39	35	52	30	32	42	33	52	524
1,541	1,688	21,690	278	232	307	261	283	241	315	276	230	227	237	267	3,154
1,302	1,442	17,981	239	181	228	192	205	162	249	178	195	175	177	193	2,374
70	93	1,099	28	18	11	12	16	20	21	18	22	15	13	19	213
1	3	61	..	1	..	..	..	..	..	..	..	..	..	1	2

Table of Mortality from the Principal Causes

Cause of Death.	Borough of									
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Total, all causes	2,189	1,947	2,127	2,073	1,897	1,888	2,557	2,056	1,715	1,719
1. Typhoid fever	28	10	15	18	14	18	44	51	39	23
2. Typhus fever	..	..	..	..	..	..	..	..	..	..
3. Malarial fever	2	2	3	4	6	1	3	3	1	2
4. Smallpox	..	4	1	1	2	..	..	..	..	..
5. Measles	15	10	13	21	22	25	21	12	5	5
6. Scarlet fever	25	24	28	14	25	10	7	2	9	10
7. Whooping cough	9	7	10	18	19	13	21	18	11	9
8. Diphtheria and croup	84	69	51	54	44	47	25	30	28	36
9. Influenza	50	31	29	7	7	2	1	2	..	1
10. Asiatic cholera	..	..	..	..	..	..	..	..	..	..
11. Cholera nostras	..	..	..	..	..	..	..	..	..	..
12. Other epidemic diseases	14	15	15	9	10	12	23	18	13	9
13. Tuberculosis pulmonalis	217	214	233	253	220	156	186	195	151	187
14. Tubercular meningitis	10	22	19	28	18	10	13	10	13	12
15. Other forms of tuberculosis	15	17	17	26	22	17	15	23	19	12
16. Cancer, malignant tumors	77	64	73	66	78	71	100	85	66	71
17. Meningitis, simple	47	32	117	130	98	67	33	27	31	14
17a. (Of which) cerebro-spinal meningitis	24	17	92	120	88	44	18	17	9	6
18. Apoplexy, congestion and softening of brain	117	112	114	100	96	73	99	87	86	72
19. Organic heart disease	145	123	183	190	171	136	121	123	81	117
20. Acute bronchitis	61	37	51	55	36	23	23	28	25	31
21. Chronic bronchitis	21	29	24	13	10	16	11	8	9	12
22. Pneumonia (excluding broncho-pneumonia)	298	245	218	221	169	123	74	89	88	140
22a. Broncho-pneumonia	113	84	101	98	85	65	49	52	50	72
23. Diseases of stomach (cancer excepted)	26	25	18	11	20	16	24	13	21	17
24. Diarrhœas (under five years)	27	27	50	40	41	273	758	418	220	144
25. Hernia, intestinal obstruction	12	21	19	14	18	14	14	20	17	10
26. Cirrhosis of liver	24	26	22	35	26	26	30	21	34	30
27. Bright's disease and nephritis	207	182	165	179	156	152	135	148	168	139
28. Diseases of women (not cancer)	6	7	15	17	10	9	9	2	3	8
29. Puerperal septicæmia	10	12	15	11	12	8	6	7	3	5
30. Other puerperal diseases	13	14	10	13	19	13	22	12	17	12

of Death During the Year 1905.

Brooklyn.			Borough of Queens.												
Nov.	Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct	Nov.	Dec.	Total
1,763	2,004	23,935	251	255	250	267	233	224	392	303	253	236	258	269	3,191
18	19	297	2	2	..	6	2	3	2	2	1	4	3	4	31
..	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	29	..	2	..	..	1	..	1	..	..	..	..	..	4
..	..	8	..	..	..	..	..	..	..	..	..	..	..	..	..
24	20	193	1	2	..	..	2	2	2	1	..	..	..	2	11
15	13	182	4	1	..	2	2	2	..	2	..	..	2	..	15
6	7	138	1	2	2	1	5	2	3	2	2	1	1	..	22
51	75	504	6	6	7	6	3	2	5	6	5	8	10	8	72
8	8	146	4	4	5	1	..	..	..	..	..	..	3	..	17
..	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	...	..	..	..	..	..	..	..	..	..	..	..	..	..
7	9	154	5	1	3	2	1	2	..	6	2	3	..	..	20
207	201	2,420	23	12	20	18	27	25	27	21	27	29	27	22	278
12	6	173	..	1	4	4	5	5	2	1	1	2	..	2	27
8	25	216	1	2	1	2	1	2	2	..	..	3	1	1	16
65	83	899	6	7	11	8	3	6	10	7	9	5	13	13	98
17	23	636	3	13	12	10	13	8	12	7	4	2	4	3	91
8	12	455	1	7	9	5	9	3	7	2	3	1	1	..	45
92	77	1,125	12	22	6	13	13	14	18	8	9	13	18	25	171
116	156	1,66[illegible]	33	24	34	29	20	23	27	19	20	23	26	29	307
43	55	468	6	9	6	8	10	1	7	3	4	2	4	11	71
16	20	189	3	..	1	1	1	2	..	1	1	..	..	1	11
215	268	2,148	40	42	35	32	23	14	7	10	9	14	20	37	284
75	107	951	12	10	8	9	12	4	7	9	4	5	13	7	100
18	26	235	..	..	..	1	..	3	1	..	1	..	3	..	9
43	37	2,078	5	3	7	7	2	18	140	96	34	23	12	4	351
16	13	188	1	1	3	..	1	2	4	2	3	..	3	..	20
25	22	321	2	5	3	5	1	6	1	3	7	4	3	1	41
164	189	1,984	21	18	17	29	18	24	23	20	21	24	23	29	267
5	8	99	1	..	..	..	..	..	2	..	..	1	..	..	4
5	6	100	..	4	3	..	..	3	1	3	1	..	..	1	16
18	12	175	2	2	2	2	2	1	2	1	1	4	2	..	21

Cause of Death.	Borough of									
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
31. Congenital debility and malformations	114	99	93	91	90	112	104	121	97	101
3 . Old age	41	42	32	16	28	19	37	27	19	35
33. Violent deaths	77	73	84	74	96	96	182	112	97	93
a. Sunstroke	..	..	..	..	..	..	69	2	..	..
b. Other accidents	59	49	65	59	80	80	91	89	76	72
c. Homicide	2	6	5	2	4	2	9	6	4	5
d. Suicide	16	18	14	13	12	14	13	15	17	16
34. All other causes	270	260	266	225	224	232	305	227	231	241
35. Ill-defined causes	14	8	23	21	15	33	62	65	63	49
Under one year	338	317	370	346	282	521	1,944	635	425	387
One year and under two years	106	82	94	111	106	128	188	156	119	99
Total under five years	588	504	580	586	510	766	1,234	869	608	553
Sixty-five years and over	429	384	372	317	313	263	328	256	272	273
Seventy years and over	278	269	246	203	212	185	238	181	166	193
Males	1,129	1,027	1,125	1,079	992	1,020	1,389	1,085	897	887
Females	1,060	920	1,002	994	905	868	1,168	971	818	832
Colored	56	43	60	72	43	63	59	40	32	46
Chinese	3	1	2	2	..	..	..	..	1	1

Brooklyn.			Borough of Queens.												
Nov.	Dec.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
91	114	1,227	14	12	15	14	15	13	10	16	23	8	14	11	165
34	35	365	2	4	5	6	..	2	2	6	4	6	3	6	46
99	84	1,167	24	18	11	21	24	23	32	25	26	21	26	26	277
..	..	71	..	..	..	..	..	..	10	..	..	..	..	..	10
83	67	870	17	12	6	16	17	19	20	19	20	14	22	20	202
3	4	52	..	1	..	1	..	..	..	1	2	1	..	1	7
13	13	174	7	5	5	4	7	4	2	5	4	6	4	5	58
235	273	2,989	22	25	29	28	21	10	29	18	29	26	23	26	286
15	11	379	1	..	..	2	5	2	13	8	5	5	1	..	42
257	328	5,150	43	44	49	48	52	42	175	115	65	46	42	39	760
74	112	1,375	4	8	14	13	11	14	18	27	8	10	12	12	151
436	560	7,794	62	68	75	76	74	68	207	158	85	65	65	63	1,066
333	384	3,924	53	57	39	44	30	33	38	39	30	43	46	53	505
225	252	2,648	37	35	28	21	20	29	23	31	20	28	31	36	339
927	1,059	12,616	157	135	139	157	130	132	210	163	144	132	148	147	1,794
836	945	11,319	94	120	111	110	103	92	182	140	109	104	110	122	1,397
31	29	574	8	6	7	6	11	6	12	2	3	8	6	7	82
..	..	10	..	..	..	..	..	..	..	..	..	..	..	..	..

Table of Mortality from the Principal Causes

Cause of Death.	Borough of										
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
Total, all causes	145	87	121	107	113	96	178	158	91	100	95
1. Typhoid fever	1	..	1	..	1	..	1	3	1	2	1
2. Typhus fever	..	..	..	..	..	..	..	..	..	..	..
3. Malarial fever	..	..	..	..	..	1	..	..	..	..	..
4. Smallpox	..	..	..	..	..	..	..	..	..	..	..
5. Measles	..	..	..	..	..	..	..	..	..	1	1
6. Scarlet fever	1	1	1	..	..	..	..	1	..	..	..
7. Whooping-cough	..	..	..	2	1	1	..	3	2	..	..
8. Diphtheria and croup	1	3	3	1	2	3	1	..	..	1	1
9. Influenza	4	..	2	..	1	1	..	..	..	..	..
10. Asiatic cholera	..	..	..	..	..	..	..	..	..	..	..
11. Cholera nostras	..	..	..	..	..	..	..	..	..	..	..
12. Other epidemic diseases	..	1	..	1	..	1	..	1	..	..	..
13. Tuberculosis pulmonalis	5	10	14	10	17	17	15	20	3	16	15
14. Tubercular meningitis	1	..	2	1	3	..	2	1	..	..	1
15. Other forms of tuberculosis	1	1	1	1	..	..	4	..	..	2	..
16. Cancer, malignant tumors	8	..	5	5	3	1	3	4	2	5	5
17. Meningitis, simple	2	3	1	3	5	4	..	1	1	..	1
17a. (Of which) Cerebro-spinal meningitis	1	2	1	2	3	1	..	1	1	..	..
18. Apoplexy, congestion and softening of brain	12	7	8	12	4	4	10	6	4	5	3
19. Organic heart disease	8	9	10	13	9	6	6	8	13	5	7
20. Acute bronchitis	2	2	..	2	3	..	1	1	..	..	3
21. Chronic bronchitis	2	1	1	1	1	..	1	..	..	..	..
22. Pneumonia (excluding broncho-pneumonia)	30	16	13	9	10	5	6	8	6	4	12
22a. Broncho-pneumonia	9	6	5	1	1	..	1	1	2	4	1
23. Diseases of stomach (cancer excepted)	1	1	2	2	1	3	..	2	..	1	2
24. Diarrhœas (under 5 years)	..	..	2	1	1	6	72	46	18	6	3
25. Hernia (intestinal obstruction)	1	..	1	1	..	2	1	1	1	..	..
26. Cirrhosis of liver	1	1	2	1	1	1	2	5	2	4	..
27. Bright's disease and nephritis	15	5	10	10	14	4	3	4	4	8	9
28. Diseases of women (not cancer)	..	..	..	..	..	..	..	..	..	..	..
29. Puerperal septicæmia	1	..	2	1	..	..	..	..	..	..	..
30. Other puerperal diseases	1	4	2	..	2	..	1	1	1	1	1
31. Congenital debility and malformations	11	4	7	5	8	5	13	6	10	8	9

for the Year Ending December 31, 1905.

Richmond.		City of New York.												
Dec.	Total	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
98	1,389	6,643	6,107	6,922	6,669	6,037	5,591	7,546	6,133	5,412	5,320	5,373	5,961	73,714
..	11	50	27	33	39	28	37	72	99	90	73	50	51	649
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	3	4	4	4	7	5	9	7	3	2	2	3	53
..	..	..	4	1	1	2	..	..	1	..	..	..	..	9
..	2	32	25	49	52	66	92	63	33	15	13	40	40	520
1	5	72	68	80	52	62	34	14	7	12	20	27	25	473
..	9	20	27	37	59	41	35	53	57	30	23	10	16	408
2	18	191	173	140	161	144	117	93	86	76	91	109	163	1,544
..	8	108	65	56	16	16	6	2	2	2	2	18	18	311
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	4	35	38	36	42	50	39	38	45	27	20	26	28	424
17	159	730	685	847	812	766	647	655	652	621	676	714	730	8,535
..	11	56	63	62	73	75	47	56	40	48	51	32	41	644
..	10	35	40	43	47	44	42	44	48	35	36	26	39	479
3	44	236	203	254	248	227	228	270	239	218	245	249	258	2,875
..	21	200	235	465	488	391	209	144	102	100	78	71	101	2,584
..	12	125	167	393	446	354	168	97	68	52	42	45	68	2,025
12	87	294	277	268	275	226	215	239	183	212	195	233	274	2,891
5	99	428	471	501	519	468	380	367	357	357	402	416	474	5,140
..	14	173	141	167	170	123	86	76	75	64	85	119	138	1,417
..	7	45	44	40	29	20	21	19	13	17	17	23	27	315
9	128	799	676	643	598	464	283	188	209	219	336	565	677	5,657
2	33	507	412	474	473	389	303	255	221	177	243	294	378	4,126
2	17	55	44	39	37	39	47	47	39	41	38	40	46	512
3	158	138	125	180	151	155	536	2,086	1,316	743	443	128	135	6,136
..	8	54	44	64	46	47	42	48	60	46	38	41	40	570
..	20	73	70	78	74	68	69	74	80	96	72	65	88	907
13	99	577	510	561	528	470	464	441	430	442	479	516	526	5,944
..	..	30	32	40	44	26	26	28	22	19	22	17	21	327
..	4	38	36	43	35	32	27	16	17	17	11	12	25	309
..	14	28	44	43	40	46	29	55	42	42	48	50	39	506
6	92	371	326	341	352	370	361	418	382	363	366	328	363	4,341

Cause of Death.	Borough of										
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
32. Old age	1	..	4	2	..	1	4	2	3	4	3
33. Violent deaths	6	3	6	7	8	11	12	10	7	5	7
a. Sunstroke	..	..	..	..	..	..	5	..	..	..	..
b Other accidents	6	3	5	7	7	11	6	9	7	3	7
c. Homicide	..	..	1	..	..	..	..	..	..	..	..
d. Suicide	..	..	..	..	1	..	1	1	..	2	..
34. All other causes	20	9	16	15	15	17	19	22	11	17	8
35. Ill-defined causes	..	..	..	..	2	2	..	1	..	1	2
Under one year	17	10	14	13	15	14	80	53	29	20	19
One year and under two years	6	1	2	1	3	4	14	12	3	4	4
Total under five years	27	14	21	18	24	22	99	65	34	28	25
Sixty-five years and over	50	17	30	36	28	20	23	24	19	25	23
Seventy years and over	34	13	24	23	19	18	20	17	14	19	20
Males	81	54	75	59	64	59	113	107	57	61	55
Females	64	33	46	48	49	37	65	51	34	39	40
Colored	1	2	..	2	2	3	2	5	3	3	4
Chinese	..	..	..	..	..	..	..	..	..	..	..

Richmond.		City of New York.												
Dec.	Total	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1	25	69	72	73	50	53	38	68	53	49	63	59	76	723
8	90	321	285	343	336	368	363	616	369	388	353	378	356	4,476
..	5	..	..	..	..	..	4	210	6	..	..	..	..	220
5	76	250	215	270	266	290	297	349	302	317	283	313	279	3,431
2	3	12	19	11	9	14	7	16	16	18	16	7	20	165
1	6	59	51	62	61	64	55	41	45	53	54	58	57	660
13	182	828	798	857	741	698	681	813	659	695	663	659	725	8,817
1	9	47	43	60	77	56	82	179	188	148	116	56	40	1,092
10	294	1,169	1,092	1,259	1,281	1,126	1,352	2,802	1,963	1,415	1,180	876	1,007	16,522
..	54	350	293	398	392	383	365	558	469	329	275	201	281	4,294
15	392	1,927	1,742	2,038	2,068	1,899	2,030	3,668	2,682	1,949	1,653	1,299	1,584	24,539
37	332	1,131	1,006	1,045	900	820	716	843	671	681	771	903	1,047	10,534
25	246	746	666	710	600	543	493	587	450	437	510	593	675	7,010
66	851	3,638	3,349	3,723	3,658	3,262	3,054	4,184	3,372	2,887	2,843	2,908	3,227	40,105
32	538	3,005	2,758	3,199	3,011	2,775	2,537	3,362	2,761	2,525	2,477	2,465	2,734	33,609
2	29	189	145	153	183	156	195	209	174	148	171	124	150	1,997
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Actual Number of Deaths from Zymotic and

BOROUGH OF

Wards.	Area in Acres.	Population by Census of 1900.	Number of Persons to the acre.	Cerebro-spinal Meningitis.	Diphtheria and Croup.	Typhoid Fever.
First	154.0	9,516	61.8	12	5	2
Second	81.0	1,488	18.4	..	..	..
Third	95.0	1,797	18.9	2	1	..
Fourth	83.0	19,554	235.7	22	6	1
Fifth	168.0	8,298	49.4	9	2	1
Sixth	86.0	20,004	232.7	29	3	3
Seventh	198.0	89,237	450.7	85	22	6
Eighth	183.0	29,059	158.8	20	6	1
Ninth	322.0	59,650	185.2	61	27	16
Tenth	110.0	71,879	653.4	55	27	4
Eleventh	196.0	99,144	505.8	75	36	7
Twelfth	5,504.0	476,602	86.6	288	156	88
Thirteenth	107.0	64,117	599.2	53	14	2
Fourteenth	96.0	34,035	354.5	25	18	2
Fifteenth	198.0	24,066	121.5	31	7	4
Sixteenth	349.0	52,808	151.3	45	23	9
Seventeenth	331.0	130,796	395.1	101	52	7
Eighteenth	450.0	61,325	136.3	55	26	17
Nineteenth	1,481.0	257,448	173.8	128	103	35
Twentieth	444.0	89,798	202.2	117	25	19
Twenty-first	411.0	60,211	146.5	48	9	13
Twenty-second	1,529.0	189,261	123.7	162	92	36
Total	12,576.0	1,850,093	147.2	1,423	660	273

BOROUGH OF

Twenty-third	4,267.0	132,413	31.0	60	183	28
Twenty-fourth	22,255.8	43,009	1.9	27	17	9
Total	26,522.8	175,422	6.6	87	200	37

Certain Other Preventable Diseases, by Wards.

MANHATTAN.

Malarial Fever.	Measles.	Scarlet Fever.	Small-pox.	Whooping Cough.	Diarrhœal Diseases.	Pulmonary Tuberculosis.	Pneumonia.	Broncho Pneumonia.	All Causes.	Deaths in Institutions.	Deaths of Children under 5 Years.
1	4	2	..	4	26	52	19	37	426	48	130
..	..	..	..	..	..	4	..	..	27	..	2
..	..	..	..	..	3	11	3	4	65	..	9
..	4	3	..	3	59	93	45	82	619	1	257
..	3	..	..	2	14	37	26	16	286	281	67
..	7	..	..	1	57	99	38	72	524	14	202
..	10	17	..	5	122	111	108	141	1,456	674	582
..	4	2	..	3	55	77	35	44	554	1	210
1	9	10	..	6	137	196	114	117	1,651	428	496
..	10	4	..	3	75	116	68	93	987	1	372
..	19	7	..	11	141	146	104	158	1,581	192	718
3	81	48	..	45	862	862	700	624	9,640	2,294	3,065
1	6	13	..	6	86	61	48	88	744	..	361
..	8	3	..	1	93	63	63	135	762	2	436
..	1	4	..	2	41	84	37	40	554	8	181
..	2	8	1	13	71	149	96	55	1,222	25	274
1	19	12	..	6	203	210	140	227	2,300	105	939
..	4	4	..	3	165	195	104	102	1,738	1,426	673
..	21	24	..	40	612	675	380	375	6,276	4,702	2,448
2	11	12	..	13	156	288	159	140	2,104	168	595
2	10	3	..	7	122	207	135	78	1,704	2,658	404
3	24	24	..	34	373	501	311	261	4,451	893	1,441
14	257	200	1	208	3,473	4,237	2,733	2,889	39,671	13,921	13,862

THE BRONX.

2	55	68	..	24	228	994	222	105	3,738	1,654	1,036
3	2	3	..	7	121	447	142	48	1,790	635	389
5	57	71	..	31	349	1,441	364	153	5,528	2,289	1,425

Wards.	Area in Acres.	Population by Census of 1900.	Number of Persons to the Acre.	Cerebro-spinal Meningitis.	Diphtheria and Croup.	Typhoid Fever.
First	233.0	20,307	87.2	9	4	3
Second	97.7	8,565	87.7	6	5	2
Third	161.4	17,949	111.2	6	2	2
Fourth	111.3	12,568	112.9	4	7	3
Fifth	119.4	18,862	158.0	7	5	2
Sixth	302.9	42,485	140.2	49	12	23
Seventh	458.5	40,471	88.3	7	14	6
Eighth	1,843.2	52,414	28.4	16	33	17
Ninth	623.6	42,876	68.8	6	23	11
Tenth	318.7	39,100	122.7	22	19	6
Eleventh	252.6	22,608	89.5	24	1	11
Twelfth	663.1	30,354	45.8	12	12	1
Thirteenth	230.3	24,029	104.3	5	9	6
Fourteenth	282.6	31,483	111.4	24	21	1
Fifteenth	244.8	30,269	123.6	5	25	2
Sixteenth	244.8	56,550	231.0	14	22	6
Seventeenth	823.3	57,309	69.6	17	20	9
Eighteenth	873.0	25,133	28.8	19	15	13
Nineteenth	413.8	37,645	91.0	7	10	7
Twentieth	461.5	25,446	55.1	4	7	11
Twenty-first	483.2	58,957	122.0	14	16	10
Twenty-second	1,361.6	66,575	48.8	22	33	15
Twenty-third	736.0	61,813	84.0	11	17	18
Twenty-fourth	1,198.5	31,767	26.5	22	17	24
Twenty-fifth	567.8	48,328	85.1	17	20	16
Twenty-sixth	3,590.2	66,086	18.4	27	42	13
Twenty-seventh	400.7	43,961	109.7	11	29	3
Twenty-eighth	884.4	77,912	88.1	18	21	21
Twenty-ninth	3,800.0	27,188	7.2	34	110	19
Thirtieth	5,404.1	24,700	4.6	11	18	11
Thirty-first	6,312.3	14,609	2.3	4	3	4
Thirty-second	5,479.5	8,243	1.5	1	2	1
Total	38,977.8	1,166,582	29.9	455	594	297

BROOKLYN.

Malarial Fevers.	Measles.	Scarlet Fever.	Small-pox.	Whooping Cough.	Diarrhœal Diseases.	Pulmonary Tuberculosis.	Pneumonia.	Broncho Pneumonia.	All Causes.	Deaths in Institutions.	Deaths of Children under 5 Years.
..	2	6	..	..	69	26	32	14	374	99	151
..	3	..	..	..	21	18	17	12	239	..	76
1	2	2	1	2	18	24	22	8	267	44	82
1	..	1	..	..	22	32	30	8	254	4	76
5	1	1	..	4	54	43	52	17	363	..	159
..	4	4	..	4	101	267	126	68	1,472	730	359
1	3	5	..	3	90	60	57	17	715	63	255
1	3	2	1	7	114	74	108	45	1,056	108	417
..	3	4	..	2	44	59	64	29	710	68	214
..	7	4	..	7	98	81	106	36	819	..	335
..	..	4	..	6	57	41	68	41	738	289	221
..	5	12	..	1	64	51	60	27	551	..	220
..	1	4	..	..	42	36	54	13	558	147	129
..	11	2	..	5	118	48	64	52	692	1	385
1	8	4	..	4	78	45	62	30	545	1	225
..	4	8	..	3	104	39	81	39	701	1	332
..	9	5	..	3	128	69	98	69	959	..	384
..	5	1	..	3	77	120	88	38	871	368	259
..	2	6	..	2	44	56	53	14	501	9	150
..	..	3	..	4	45	60	71	27	688	287	161
2	4	3	..	6	84	110	85	27	893	7	274
2	4	6	..	7	82	101	79	39	1,158	213	318
2	3	2	..	4	50	71	85	21	976	148	199
3	3	8	..	7	52	217	91	34	1,059	490	209
..	4	1	..	6	80	63	67	20	772	70	214
..	7	3	..	10	150	101	84	74	1,137	71	520
3	4	5	..	4	86	70	66	22	689	44	251
3	3	7	..	5	99	109	88	29	1,245	255	306
..	84	67	6	23	69	262	124	34	1,929	1,576	508
2	3	2	..	6	70	36	33	32	516	81	225
1	1	..	..	..	48	18	25	11	348	37	132
1	..	..	..	..	16	13	8	5	140	14	48
29	193	182	8	138	2,274	2,420	2,148	951	23,935	5,225	7,794

BOROUGH OF

Wards.	Area in Acres.	Population by Census of 1900.	Number of Persons to the Acre.	Cerebro-spinal Meningitis.	Diphtheria and Croup.	Typhoid Fever.
First	4,650	48,272	10.4	19	17	16
Second	14,700	40,903	2.8	12	38	7
Third	22,000	25,870	1.2	12	3	5
Fourth	36,600	30,761	.8	5	11	3
Fifth	3,770	7,193	1.9	..	3	..
Total	81,720	152,999	1.9	48	72	31

BOROUGH OF

Wards.	Area in Acres.	Population by Census of 1900.	Number of Persons to the Acre.	Cerebro-spinal Meningitis.	Diphtheria and Croup.	Typhoid Fever.
First	3,340	21,441	6.4	7	9	7
Second	4,130	13,200	3.2	1	3	3
Third	10,050	13,701	1.4	2	3	..
Fourth	8,180	9,516	1.2	1	1	..
Fifth	10,900	9,163	.8	1	2	1
Total	36,600	67,021	1.8	12	18	11

QUEENS.

Malarial Fevers.	Measles.	Scarlet Fever.	Small-pox.	Whooping Cough.	Diarrhœal Diseases.	Pulmonary Tuberculosis.	Pneumonia.	Broncho Pneumonia.	All Causes.	Deaths in Institutions.	Deaths of Children under 5 Years.
..	3	5	..	6	92	117	87	41	1,031	237	310
2	6	7	..	7	108	68	71	27	810	10	336
..	..	3	..	3	47	48	53	8	485	113	140
2	1	..	..	3	64	38	64	21	714	120	217
..	1	..	..	3	53	7	9	3	151	25	63
4	11	15	..	22	364	278	284	100	3,191	505	1,066

RICHMOND.

Malarial Fevers.	Measles.	Scarlet Fever.	Small-pox.	Whooping Cough.	Diarrhœal Diseases.	Pulmonary Tuberculosis.	Pneumonia.	Broncho Pneumonia.	All Causes.	Deaths in Institutions.	Deaths of Children under 5 Years.
..	1	3	..	1	17	70	63	17	605	356	116
1	..	1	..	2	75	36	26	8	250	54	71
..	1	1	..	2	21	25	14	3	196	23	69
..	..	..	..	3	29	11	11	3	202	64	102
..	..	..	..	1	29	17	14	2	136	9	34
1	2	5	..	9	171	159	128	33	1,389	506	392

Deaths According to Nativity of

Country.	Nativity of Deceased. Borough of— Manhattan.	The Bronx.	Brooklyn.
United States	24,467	3,373	15,501
Ireland	5,185	661	2,946
Germany	3,322	695	2,373
Italy	1,489	173	669
Russia	1,435	112	460
England	611	123	615
Austro-Hungary	1,030	89	206
Scotland	215	37	164
British America	201	34	159
Switzerland	135	27	37
France	219	36	68
Bohemia	180	13	2
Roumania	152	7	19
Poland	51	11	53
Syria	10	1	6
Sweden	155	33	208
Norway	57	11	141
Denmark	42	9	48
Finland	25	11	22
Holland	46	1	11
Cuba	28	2	6
Other West Indies	70	14	46
Belgium	41	3	9
Spain	23	1	20
Greece	42	....	3
China	69	1	10
Australia	5	3	3
Other Foreign	74	7	39
Unknown	292	40	91
Mixed nationalities	....	....	....
Total	39,671	5,528	23,935

Deceased and Parents of Deceased.

Nativity of Deceased.			Nativity of Parents of Deceased.					
Borough of—		City of New York.	Borough of—					City of New York.
Queens.	Richmond.		Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	
2,077	861	46,279	6,921	1,148	5,977	859	387	15,292
247	168	9,207	8,816	1,213	4,890	457	256	15,632
507	121	7,018	4,722	1,052	3,505	792	181	10,252
82	35	2,448	4,674	392	1,889	174	73	7,002
28	12	2,047	3,010	214	1,072	71	28	4,395
67	63	1,479	600	119	688	78	56	1,541
22	11	1,358	2,246	132	459	51	23	2,911
16	15	447	243	44	210	29	20	546
13	15	422	148	24	101	7	9	289
11	7	217	150	28	44	12	8	242
25	11	359	258	32	80	26	16	412
18	1	214	326	14	2	31	1	374
....	1	179	284	13	43	....	1	341
22	3	140	78	18	163	62	9	330
1	1	19	40	1	13	1	4	59
16	15	427	207	44	339	23	14	627
3	10	222	69	17	243	6	13	348
7	5	111	46	9	61	6	5	127
3	4	65	48	22	44	2	3	119
1	....	59	54	1	22	....	1	78
....	....	36	22	3	4	....	....	29
1	9	140	82	8	49	1	6	146
....	2	55	41	4	12	....	....	57
....	1	45	27	2	21	....	....	50
....	....	45	50	1	5	....	....	56
....	1	81	55	2	9	....	....	66
1	....	12	2	1	1	....	....	4
14	6	140	54	4	37	7	4	106
9	11	443	3,348	351	1,256	141	153	5,249
....	....	....	3,050	615	2,696	355	118	6,834
3,191	1,389	73,714	39,671	5,528	23,935	3,191	1,389	73,714

** Deaths by Suicide in The*

	Austria-Hungary.		Bohemia.		England.		France.		Germany.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Cuts and stabs	..	..	..	..	2	2	2	..	10	1
Drowning	..	1	..	..	..	..	..	..	2	..
Gunshots	2	..	..	..	5	..	3	..	47	1
Hanging	2	..	1	..	1	..	1	..	34	4
Leaps	1	1	..	..	..	1	..	1	3	1
Railroads	..	..	..	..	..	..	..	..	1	..
Dynamite	..	..	..	..	..	..	..	..	1	..
Aconite	..	..	..	..	..	..	..	..	..	..
Ammonia	..	..	..	..	..	..	..	..	1	..
Arsenic	..	..	..	..	..	..	..	..	1	..
Bichloride of mercury	..	..	..	..	..	..	..	..	..	..
Carbolic acid	3	3	1	..	1	..	..	..	10	7
Chloroform	..	..	..	..	..	..	1	..	..	..
Cyanide of potassium	..	..	..	..	1	..	..	..	..	..
Hydrochloric acid	..	..	..	..	..	..	..	..	1	..
Hydrocyanic acid	..	..	..	..	..	..	..	..	..	..
Illuminating gas	4	3	1	1	4	3	1	..	42	10
Irritant poison	..	..	..	..	1	..	..	..	1	..
Morphine	..	..	..	..	..	..	..	..	..	..
Nux vomica	..	..	..	..	..	..	..	..	..	..
Opium	..	..	..	..	..	..	..	..	..	..
Oxalic acid	..	..	..	..	..	..	..	..	..	1
Paris green	..	..	..	..	..	..	..	..	..	1
Paraldehyde	..	1	..	..	..	..	..	..	..	..
Phosphorus	..	..	..	..	..	..	..	1	..	..
Rough on rats	..	..	..	..	..	..	..	..	..	..
Shoe blacking	..	..	..	..	..	..	..	..	..	..
Strychnine	..	..	..	..	..	..	..	..	1	..
Unknown poison	..	..	..	..	..	..	..	..	2	..
Wood alcohol	..	..	..	..	..	..	..	..	..	1
Total by sexes	12	9	3	2	15	5	8	2	157	27
Total of both sexes	21		5		20		10		184	

* The 660 suicides in The City of New York occurred in the boroughs as follows:

City of New York.

Ireland.		Italy.		Russia.		Other foreign countries.		United States.		Unknown.		Total.	
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
4	..	1	..	1	..	5	..	8	3	1	..	34	6
..	..	..	..	..	..	..	..	3	1	..	..	5	2
7	1	7	2	6	..	12	1	85	10	17	..	191	15
5	1	1	..	4	1	5	3	10	6	5	..	69	15
2	3	3	..	4	2	2	..	4	7	2	..	21	16
..	..	..	..	..	..	..	..	5	..	1	..	7	..
..	..	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	1	..
..	1	..	..	..	..	1	..	..	..	..	..	2	1
..	..	..	1	..	..	..	..	..	..	..	..	..	1
5	3	..	..	6	4	3	2	14	22	4	1	47	42
..	..	..	..	..	..	1	..	1	..	..	..	3	..
..	..	..	..	1	..	2	..	1	..	..	..	5	..
..	..	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..
3	1	2	..	12	2	5	1	25	15	12	1	111	37
..	..	..	..	..	..	..	..	..	..	..	1	2	1
..	..	..	..	..	..	..	..	2	..	1	..	3	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..
..	..	..	..	..	..	..	..	..	2	..	..	..	2
..	..	..	..	..	..	..	1	..	1	..	..	..	3
1	..	..	..	..	..	..	..	..	1	..	..	1	2
..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	1	..	..	..	1
1	..	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	1	..	1	..	..	2	2
..	..	..	..	..	..	..	..	..	..	..	..	..	1
28	10	14	3	34	9	36	9	162	69	43	3	512	148
38		17		43		45		231		46		660	

Manhattan, 379; The Bronx, 43; Brooklyn, 174; Queens, 58; Richmond, 6.

Deaths by Suicide in

	Austria-Hungary.		Bohemia.		England.		France.		Germany.	
	M.	F.	M.	F.	M.	F.	M.	F.	M	F.
Cuts and stabs	..	..	..	..	..	2	1	..	3	1
Drowning	..	1	..	..	..	..	..	..	..	..
Gunshot	1	..	..	..	2	..	2	..	24	1
Hanging	1	..	1	..	..	..	1	..	13	2
Leaps	1	..	..	..	..	..	..	1	3	..
Railroads	..	..	..	..	..	..	..	..	1	..
Arsenic	..	..	..	..	..	..	..	..	..	..
Bichloride of mercury	..	..	..	..	..	..	..	..	..	..
Carbolic acid	3	3	1	..	1	..	..	..	6	6
Chloroform	..	..	..	..	..	..	1	..	..	..
Cyanide of potassium	..	..	..	..	1	..	..	..	..	..
Hydrocyanic acid	..	..	..	..	..	..	..	..	..	..
Illuminating gas	4	2	1	1	1	2	1	..	23	9
Morphine	..	..	..	..	..	..	..	..	..	..
Nux vomica	..	..	..	..	..	..	..	..	..	..
Opium	..	..	..	..	..	..	..	..	..	..
Oxalic acid	..	..	..	..	..	..	..	..	..	1
Paris green	..	..	..	..	..	..	..	..	..	..
Rough on rats	..	..	..	..	..	..	..	..	..	..
Shoe blacking	..	..	..	..	..	..	..	..	..	..
Strychnine	..	..	..	..	..	..	..	..	..	..
Unknown poison	..	..	..	..	..	..	..	..	1	..
Total by sexes	10	6	3	1	5	4	6	1	75	20
Total of both sexes	16		4		9		7		95	

Borough of Manhattan.

Ireland.		Italy.		Russia.		Other foreign countries.		United States.		Unknown.		Total.	
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
3	..	1	..	..	..	4	..	4	1	1	..	17	4
..	..	..	..	..	..	..	..	2	1	..	..	2	2
5	1	4	1	3	..	8	1	47	6	12	..	108	10
3	..	1	..	3	..	3	1	4	3	1	..	31	6
2	2	1	..	2	2	2	..	4	4	2	..	17	9
..	..	..	..	..	..	..	..	4	..	1	..	6	..
..	1	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	1	..	..	..	..	..	..	..	..	..	1
5	2	..	..	4	2	2	1	6	8	2	1	30	23
..	..	..	..	..	..	1	..	1	..	..	..	3	..
..	..	..	..	1	..	..	..	..	..	..	..	2	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..
3	..	2	..	11	..	5	..	10	9	7	1	68	24
..	..	..	..	..	..	..	..	2	..	1	..	3	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..
..	..	..	..	..	..	..	..	1	..	..	..	1	..
..	..	..	..	..	..	..	1	..	..	..	..	..	2
..	..	..	..	..	..	..	..	..	1	..	..	..	1
..	..	..	..	..	..	..	..	..	1	..	..	..	1
1	..	..	..	..	..	..	..	..	..	..	..	1	..
1	..	..	..	..	..	..	..	..	..	..	..	1	..
..	..	..	..	..	..	..	1	..	1	..	..	1	2
22	6	9	2	24	4	25	5	87	35	27	2	293	86
28		11		28		30		122		29		379	

Deaths by Accident and Negligence.

	Borough of Manhattan.	Borough of The Bronx.	Borough of Brooklyn.	Borough of Queens	Borough of Richmond.	City of New York.
Fractures and Contusions—						
Crushed by boats, etc.	3	..	1	2	..	6
" by diving	2	..	1	..	..	3
" by derricks	4	..	3	..	..	7
" by elevators	36	..	6	1	..	43
" by explosions	12	1	2	2	..	17
" by machinery	8	..	8	1	..	17
" by falling buildings	4	..	9	1	..	14
" by falling stones, etc.	16	6	5	2	1	30
" by other falling bodies	25	8	13	5	..	51
Other causes	32	1	5	4	1	43
Not defined by Coroners	81	3	38	3	..	125
Falls—						
Down air-shaft	14	..	..	..	..	14
" areaway	6	..	1	..	..	7
" elevator shaft	19	..	5	..	..	24
" stairs	83	8	44	2	2	139
From buildings	120	9	15	5	..	149
" fire-escapes	20	2	7	..	..	29
" scaffolds	19	4	5	4	1	33
" windows	61	6	30	1	..	98
On ship	3	..	10	1	..	14
On sidewalks and streets	19	2	20	2	..	43
Others	54	17	42	9	4	126
Not specified	60	5	7	2	..	74
Street vehicles—						
Run over by wagons, trucks, etc.	132	6	35	2	1	176
Falls from wagons, trucks, etc.	28	6	18	6	..	58
Run over by automobiles	22	3	5	6	..	36
Other vehicle accidents	4	3	2	..	..	9
Railroads—						
Elevated railroads	30	3	7	..	..	40
Electric roads	55	19	86	14	4	178

	Borough of					City of New York.
	Manhattan.	The Bronx.	Brooklyn.	Queens	Richmond.	
Railroads—						
Steam railroads	29	53	12	52	11	157
Horse cars	1	..	..	..	..	1
Subway	18	3	..	..	..	21
Not specified by Coroners	27	2	2	1	1	33
Wounds—						
Gunshot	25	1	3	3	..	32
Incised	4	..	..	..	..	4
Lacerated	11	..	2	..	..	13
Others	5	1	..	..	..	6
Not specified by Coroners	9	..	5	..	..	14
Horses—						
Kicked by	9	..	7	1	..	17
Runaways, falls, etc	3	1	4	1	..	9
Burns—						
Conflagrations, etc	45	6	16	2	..	69
Oil or gas stoves	34	6	16	2	3	61
Lamps	3	1	4	1	1	10
Other causes	30	12	44	10	7	103
Not defined by Coroners	67	..	12	2	..	81
Scalds—						
Hot fluids	50	6	35	5	..	96
Steam	4	..	..	3	..	7
Not specified by Coroners	9	..	..	..	..	9
Sunstroke	134	17	71	10	7	239
Electric shock	6	1	13	1	3	24
Neglect and Exposure	5	2	3	1	2	13
Drowning	251	44	138	29	26	488
Illuminating gas	207	11	82	5	3	308

	Borough of—					City of New York
	Manhattan.	The Bronx.	Brooklyn.	Queens	Richmond.	
Poisons—						
Alcohol	1	..	1	..	..	2
Alkali caustic	1	..	..	..	..	1
Anaesthetic	2	..	..	..	..	2
Arsenic	1	..	..	..	..	1
Atropine	1	..	..	..	..	1
Bichloride of mercury	1	..	..	..	..	1
Carbolic acid	15	2	8	..	..	25
Chloral	..	..	2	..	..	2
Chloroform	2	..	1	..	1	4
Ether	7	..	..	..	..	7
Irritant poison	..	..	1	..	..	1
Lead	..	..	..	..	1	1
Mercury	..	..	2	..	..	2
Morphine	10	..	..	..	..	10
Narcotic	..	..	1	..	..	1
Nitrous oxide	1	1	..	..	..	2
Omega Oil	..	..	1	..	..	1
Opium	5	2	..	1	..	8
Oxalic acid	3	..	..	..	..	3
Paregoric	2	..	..	..	..	2
Phosphoru s	1	..	..	..	..	1
Potash lye	3	..	..	..	..	3
Ptomaines	7	..	2	..	1	10
Strychnine	..	..	2	..	..	2
Turpentine	1	..	..	..	..	1
Wintergreen, oil of	..	..	1	..	..	1
Wood alcohol	1	1	..	..	..	2
Unknown poison	3	1	2	1	..	7
Suffocation—						
Caving in of embankment	2	..	2	2	..	6
Food in larynx	3	..	..	..	..	3
Foreign body in larynx	8	2	2	1	..	13
Overlaid in bed	12	..	2	2	..	16

	Borough of—					City of New York.
	Manhattan.	The Bronx.	Brooklyn.	Queens	Richmond.	
Suffocation—						
Others	12	..	1	1	..	14
Not specified by Coroners	1	2	..	..	..	3
Circumcision	24	..	..	..	..	24
Criminal abortion	9	2	11	..	..	22
Cæsarean section	26	..	..	..	..	26
Surgical operation	2	..	..	..	..	2

RECAPITULATION.

	Borough of—					City of New York.
	Manhattan.	The Bronx.	Brooklyn.	Queens	Richmond.	
Fractures and contusions	223	19	91	21	2	356
Falls	478	53	186	26	7	750
Street Vehicles	186	18	60	14	1	279
Railroads	160	80	107	67	16	430
Wounds	54	2	10	3	..	69
Horses	12	1	11	2	..	26
Burns	134	19	76	15	11	255
Scalds	63	6	35	8	..	112
Conflagrations	45	6	16	2	..	69
Sunstroke	134	17	71	10	7	239
Electric current	6	1	13	1	3	24
Drowning	251	44	138	29	26	488
Illuminating gas	207	11	82	5	3	308
Poison	68	7	24	2	3	104
Suffocation	38	4	7	6	..	55
Circumcision	24	..	..	..	..	24
Criminal abortion	9	2	11	..	..	22
Cæsarean section	2	..	..	..	..	2
Neglect and exposure	5	2	3	1	2	13
Surgical operation	26	..	..	..	..	26
Total deaths from accident and negligence	2,125	292	941	212	81	3,651

Births by Nativities of Parents.

Country.	Manhattan. Nativity of Both Parents.	Manhattan. Nativity of Mother Only.	The Bronx. Nativity of Both Parents.	The Bronx. Nativity of Mother Only.	Brooklyn. Nativity of Both Parents.	Brooklyn. Nativity of Mother Only.	Queens. Nativity of Both Parents.	Queens. Nativity of Mother Only.	Richmond. Nativity of Both Parents.	Richmond. Nativity of Mother Only.	City of New York. Nativity of Both Parents.	City of New York. Nativity of Mother Only.
Austria-Hungary	6,704	1,222	146	48	995	291	68	29	43	2	7,956	1,592
Bohemia	519	129	17	5	5	4	29	9	1	..	571	147
British America	80	152	18	34	68	125	8	23	7	12	181	346
England	227	564	36	85	159	365	28	42	21	17	471	1,073
France	134	122	4	18	7	32	14	18	38	9	197	199
Germany	2,095	933	506	205	1,660	671	474	177	83	15	4,818	2,001
Ireland	3,827	1,662	327	196	1,441	793	145	95	106	50	5,846	2,796
Italy	11,795	165	868	7	4,976	30	433	9	180	7	18,252	218
Russia and Poland	10,358	775	346	39	3,668	206	223	22	75	1	14,670	1,043
Scotland	82	155	18	22	62	102	15	15	6	5	183	299
Sweden	371	179	75	21	462	121	22	15	59	5	989	341
Switzerland	42	83	12	9	6	17	5	9	6	2	71	120
United States	12,021	3,945	2,676	730	10,918	2,701	1,850	530	760	163	28,225	8,069
Other Foreign	1,488	357	97	58	904	179	28	20	10	4	2,527	618
Unknown	....	17	36	..	4	..	..	..	5	..	45	17
Total	49,743	10,460	5,182	1,477	25,335	5,637	3,342	1,013	1,400	292	85,002	18,879

Table of Births in The City of New York

Months.	Total.	White.		Colored.	
		M.	F.	M.	F.
January	8,623	4,387	4,076	91	69
February	7,976	3,926	3,905	69	76
March	8,790	4,348	4,267	87	SS
April	8,117	4,094	3,899	65	59
May	8,606	4,340	4,114	75	77
June	8,837	4,457	4,225	78	77
July	8,642	4,351	4,146	75	70
August	9,673	4,837	4,663	88	85
September	8,485	4,285	4,076	55	69
October	8,937	4,512	4,303	63	59
November	8,206	4,075	3,992	80	59
December	8,989	4,496	4,354	65	74
Total	103,881	52,108	50,020	891	862

Table of Marriages in The City of New York

Months.	Total.	White.		Colored.		Chinese.	
		M.	F.	M.	F.	M.	F.
January	3,557	3,419	3,420	136	137	2	..
February	3,004	2,930	2,933	72	71	2	..
March	3,326	3,227	3,227	98	99	1	..
April	2,680	2,575	2,580	102	100	3	..
May	3,366	3,263	3,264	99	101	4	1
June	4,837	4,686	4,690	149	147	2	..
July	3,429	3,344	3,344	85	85	..	..
August	3,026	2,907	2,908	118	118	1	..
September	3,843	3,731	3,733	111	110	1	..
Octob r	3,739	3,623	3,622	115	116	1	1
November	3,590	3,489	3,488	100	102	1	..
December	4,278	4,119	4,114	158	164	1	..
Total	42,675	41,313	41,323	1,343	1,350	19	2

for the Year Ending December 31, 1905.

Nativity of Parents.								Births Reported by		Apparently Illegitimate.	Twins.	Triplets.
Native.		Foreign.		Mixed.		Not Stated.		Physicians.	Midwives.			
M.	F.	M.	F.	M.	F.	M.	F.					
1,222	1,116	2,625	2,437	573	546	58	46	5,101	3,522	140	68	..
1,108	1,062	2,340	2,386	502	478	45	55	4,343	3,643	116	63	..
1,224	1,202	2,645	2,567	524	535	42	51	4,947	3,843	129	77	..
1,090	1,042	2,501	2,397	532	479	36	41	4,818	3,299	123	58	1
1,246	1,225	2,572	2,408	552	516	45	42	5,033	3,573	141	63	1
1,296	1,218	2,586	2,462	588	558	65	64	5,249	3,588	187	76	..
1,223	1,085	2,604	2,574	563	519	36	38	4,956	3,686	108	68	..
1,390	1,254	2,873	2,832	620	622	42	40	5,601	4,072	147	70	..
1,157	1,129	2,604	2,455	538	527	41	34	4,835	3,650	134	60	..
1,239	1,127	2,728	2,620	572	579	36	36	5,279	3,658	130	73	1
1,131	1,042	2,469	2,442	525	527	30	40	4,807	3,399	126	58	1
1,247	1,150	2,692	2,689	575	546	47	43	5,092	3,897	139	69	..
14,573	13,652	31,239	30,268	6,664	6,432	523	530	60,051	43,830	1,620	803	4

for the Year Ending December 31, 1905.

Native.		Foreign.		Single.		Widowed.		Divorced.	
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
1,501	1,600	2,056	1,957	3,192	3,223	350	306	15	28
1,284	1,410	1,720	1,594	2,676	2,700	311	278	17	26
1,385	1,502	1,941	1,834	2,955	2,996	344	305	27	25
1,273	1,369	1,407	1,311	2,384	2,377	273	267	23	36
1,463	1,535	1,903	1,831	2,978	3,036	360	289	28	41
2,342	2,511	2,495	2,326	4,382	4,384	431	384	24	69
1,554	1,643	1,875	1,786	3,070	3,120	340	284	19	25
1,359	1,409	1,667	1,617	2,683	2,673	321	320	22	33
1,758	1,914	2,085	1,929	3,436	3,465	389	347	18	31
1,809	1,944	1,940	1,795	3,338	3,336	374	351	27	52
1,478	1,558	2,112	2,032	3,244	3,276	320	280	26	34
1,834	1,969	2,444	2,309	3,887	3,904	359	320	32	54
19,040	20,354	20,635	22,321	38,225	38,490	4,172	3,731	278	454

DEATHS IN INSTITUTIONS FOR YEAR ENDING DECEMBER 31, 1905.

Borough of Manhattan

Babies' Hospital	300
Bellevue Hospital	2,549
Beth Israel Hospital	217
City Hospital	640
Columbus Hospital	38
Flower Hospital	170
Foundling Hospital	992
French Hospital	105
General Memorial Hospital	33
German Hospital	239
Gouverneur Hospital	427
Hahnemann Hospital	29
Harlem Hospital	384
Homes for Aged, Little Sisters of the Poor	83
Home for Aged and Infirm Hebrews	26
House of Relief	262
Immigration Hospital, Ellis Island	43
J. Hood Wright Memorial Hospital	216
Lying-In Hospital	231
Manhattan State Hospital	355
Maternity Hospital	89
Metropolitan Hospital	1,197
Montefiore Home	91
Mount Sinai Hospital	514
New York City Home for Aged and Infirm	314
New York Hospital	504
New York Eye and Ear Hospital	35
New York City School and Hospital	104
New York Infant Asylum	193
New York Infirmary for Women and Children	38
Nursery and Child's Hospital	75
Polyclinic Hospital	62
Post-Graduate Hospital	345
Presbyterian Hospital	478
Reception Hospital	130
Roosevelt Hospital	502
St. Francis Hospital	192
St. Luke's Hospital	310
St. Mark's Hospital	67
St. Mary's Free Hospital for Children	57

St. Vincent's Hospital	384
Skin and Cancer Hospital	20
Sloane Maternity Hospital	104
Sydenham Hospital	56
Trinity Hospital	21
Willard Parker Hospital	111
Workhouse Hospital	38
Other institutions	551
Total	13,921

Borough of The Bronx.

Fordham Hospital	160
Home for Incurables	83
Lebanon Hospital	312
Lincoln Hospital and Home	447
Odd Fellows' Home	7
Riverside Hospital	328
St. Joseph's Hospital	567
Seton Hospital	312
Workhouse (Branch Hart's Island)	43
Other Institutions	30
Total	2,289

Borough of Brooklyn.

Angel Guardian Home	75
Bradford Street Hospital	11
Brooklyn Hospital	279
Brooklyn Maternity Hospital	2
Bushwick Hospital	69
Cumberland Street Hospital	282
Eastern District Hospital	91
German Hospital	172
German Evangelical Home	45
Home for the Aged, Little Sisters of the Poor	97
Home for Consumptives	170
House of Good Shepherd	6
Infants' Hospital	27
Kings County Hospital	851
Kings County Jail	10
Kings County Penitentiary	7

Kings County Emergency Hospital	13
Kingston Avenue Hospital	287
Long Island College Hospital	276
Long Island State Hospital	100
Lutheran Hospital	31
Memorial and Prospect Heights Hospital	45
Norwegian Hospital	108
New York City Home for Aged and Infirm	335
St. Catharine's Hospital	358
St. Christopher's Hospital	89
St. John's Hospital	96
St. Mary's Hospital	276
St. Mary's Maternity	37
St. Peter's Hospital	448
Williamsburg Hospital	75
Other institutions	457
Total	5,225

Borough of Queens.

Flushing Hospital	95
Jamaica Hospital	47
River Crest Sanitarium	22
St. John's Hospital	216
St. Joseph's Hospital	12
St. Mary's Hospital	66
Other Institutions	47
Total	505

Borough of Richmond.

Almshouse	25
Mt. Loretto	10
Nursery and Child's Hospital	10
Quarantine Hospitals	1
Sailors' Snug Harbor	75
Seaside Hospital	60
S. R. Smith Infirmary	141
St. Vincent's Hospital	135
United States Marine Hospital	40
Other institutions	9
Total	506

Recapitulation.

Prisons	132
Hospitals	18,460
Institutions for Insane	490
Institutions for Children	2,111
Homes for Aged	503
Almshouses	674
Other institutions	76
Total	22,446

Deaths of Persons 100 Years of Age and Over.

Date of Death.	Name.	Age. Years.	Months.	Days.	Nativity.	Cause of Death.	Borough of— Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	City of New York.
1905.												
Feb. 14.	Rachel Martens	104	..	11	United States.	Old age	..	..	1	..	..	1
Feb. 20.	Joseph McGrath	107	..	..	Ireland	Chronic Nephritis	1	..	..	..	..	1
Mar. 16.	Catherine Carroll	107	..	..	Ireland	Old age	1	..	..	..	..	1
Apr. 12.	Thomas Butler	104	..	..	Ireland	Bright's Disease	1	..	..	..	..	1
Apr. 14.	Ann Andress	104	..	..	United States.	Arterio sclerosis	1	..	..	..	..	1
May 15.	Bertha Hirsch	106	..	..	Germany	Old age	1	..	..	..	..	1
May 9.	Joseph Lewis	100	..	..	Germany	Apoplexy	1	..	..	..	..	1
May 22.	Maria Jackson	100	9	9	United States.	Old age	..	..	1	..	..	1
Oct. 25.	Mary Ann Van Dyke	114	7	11	United States.	Old age	..	..	1	..	..	1
Oct. 27.	Lucy Sexton	100	..	..	Ireland	Fall	..	..	1	..	..	1
Oct. 30.	Rosetti Verardi	101	..	..	Italy	Pneumonia	..	..	1	..	..	1
						Total	6	..	5	..	..	11

Disposition of the Dead and of Still-born Infants in The City of New York.

Cemetery.	Borough of— Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	City of New York.
Acacia	....	....	....	113	....	113
Almshouse	....	....	....	....	79	79
A. M. E. Zion	....	....	....	....	6	6
Aqueduct	....	....	....	2	....	2
Bayside	....	....	....	545	....	545
Baron Hirsch	....	....	....	....	155	155
Bethel	....	....	....	....	76	76
Calvary	....	....	....	21,596	....	21,596
Canarsie	....	....	49	....	....	49
Cedar Grove	....	....	....	813	....	813
City	....	5,200	....	....	....	5,200
County Farms	....	....	1,117	....	....	1,117
Cypress Hills	....	....	664	1,327	....	1,991
Douglaston	....	....	....	9	....	9
Elmhurst	....	....	....	1	....	1
Evergreen	....	....	972	3,779	....	4,751
Fairview	....	....	....	....	102	102
Flatlands	....	....	4	....	....	4
Flushing	....	....	....	287	....	287
Fountain	....	....	....	....	19	19
Friends	....	....	11	....	....	11
Grace Church	....	....	....	4	....	4
Gravesend	....	....	19	....	....	19
Greenwood	....	....	4,062	....	....	4,062
Hansen's	....	....	....	1	....	1
Hillside	....	....	....	....	9	9
Holy Cross	....	....	6,044	....	....	6,044
Holy Trinity	....	....	1,700	....	....	1,700
Jamaica	....	....	....	17	....	17
Lake	....	....	....	....	62	62
Lakeville	....	....	....	1	....	1
Linden Hill	....	....	....	2,226	....	2,226
Little Neck	...	....	....	2	....	2
Long Island State Hospital	....	....	5	....	....	5
Lutheran	....	....	....	5,870	1	5,871

Cemetery.	Borough of— Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	City of New York.
Machpelah	....	....	....	216	....	216
Maimonides	....	....	95	....	....	95
Maple Grove	....	....	....	255	....	255
Marble	3	....	....	....	....	3
Merrill	....	....	....	....	1	1
Methodist Episcopal	....	....	....	1	....	1
Moravian	....	....	....	....	270	270
Mount Hope	....	....	109	....	....	109
Mount Loretto	....	....	....	....	8	8
Mount Nebo	....	....	....	152	....	152
Mount Olivet	....	....	....	1,980	....	1,980
Mount Zion	....	....	....	2,793	....	2,793
National	....	....	79	....	....	79
New Springville	....	....	....	....	10	10
New Union Fields	....	....	....	215	....	215
Nursery and Child's Hospital	....	....	....	....	10	10
Ocean View	....	....	....	....	35	35
Pelham Bay	....	4	....	....	....	4
Prospect	....	....	....	16	....	16
Sailors' Snug Harbor	....	....	....	....	69	69
Salem Fields	....	....	204	....	....	204
Springfield	....	....	....	38	....	38
St. Andrews	....	....	....	....	2	2
St. John's	....	....	....	1,639	....	1,639
St. Joseph's	....	....	....	....	15	15
St. Luke's	....	....	....	....	11	11
St. Mark's Churchyard	5	....	....	....	....	5
St. Mary's	....	....	....	264	....	264
St. Mary's, Carmelite	....	....	....	....	9	9
St. Mary's, Third Ward	....	....	....	....	32	32
St. Mary's, Fourth Ward	....	....	....	....	127	127
St. Michael's	....	....	....	1,638	....	1,638
St. Monica's	....	....	....	109	....	109
St. Peter's	....	8	....	....	258	266
St. Phillip's	....	....	....	....	1	1
St. Raymond's	....	1,871	....	....	....	1,871
Silver Lake	....	....	....	....	1,494	1,494

Cemetery.	Borough of—					City of New York.
	Manhattan.	The Bronx.	Brooklyn.	Queens.	Richmond.	
Silver Mount	....	....	....	....	91	91
Staten Island	....	....	....	....	22	22
Sylvan	....	....	....	....	7	7
Trinity	58	....	....	....	....	58
Union Fields	....	....	....	511	....	511
United Jewish Congregations	....	....	47	....	....	47
United States Crematory	....	....	....	832	....	832
Vaughn	....	....	....	....	1	1
Washington	....	....	2,719	3	....	2,722
West Baptist	....	....	....	....	4	4
West Farms	....	2	....	....	....	2
Williamson's	....	....	....	2	....	2
Woodhaven	....	....	....	4	....	4
Woodland	....	....	....	....	155	155
Woodlawn	....	2,040	....	....	....	2,040
Woodrow Church	....	....	....	....	12	12
Total	66	9,125	17,900	47,261	3,153	77,505

Meteorology.

1905.	Temperature (in shade). (Fahrenheit.)			Humidity.			Barometer.	Rainfall.	Direction of Wind.
	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Inches.	Prevailing.
January	29.32	53	4	70.52	98	37	30.008	2.77	N.N.W,
February	24.75	41	6	68.13	99	44	30.051	2.01	W.N.W.
March	40.36	73	14	68.49	96	37	30.036	3.49	N.W.
April	49.94	75	33	63.93	95	30	29.802	2.39	N.W.
May	61.47	81	41	70.03	95	34	29.930	.72	S.
June	69.85	91	52	76.15	97	39	29.906	3.77	N.W.
July	77.07	96	63		94	42	29.925	3.05	S.
August	74.28	92	60	78.90	94	43	29.921	4.81	S.W.
September	69.64	88	47	78.12	93	46	29.971	5.84	N.W.
October	59.38	82	39	71.82	94	45	30.017	3.55	W.S.W.
November	44.11	64	20	66.45	94	36	29.934	1.67	W.N.W
December	38.85	59	20	68.90	97	38	29.972	3.37	W.S.W.